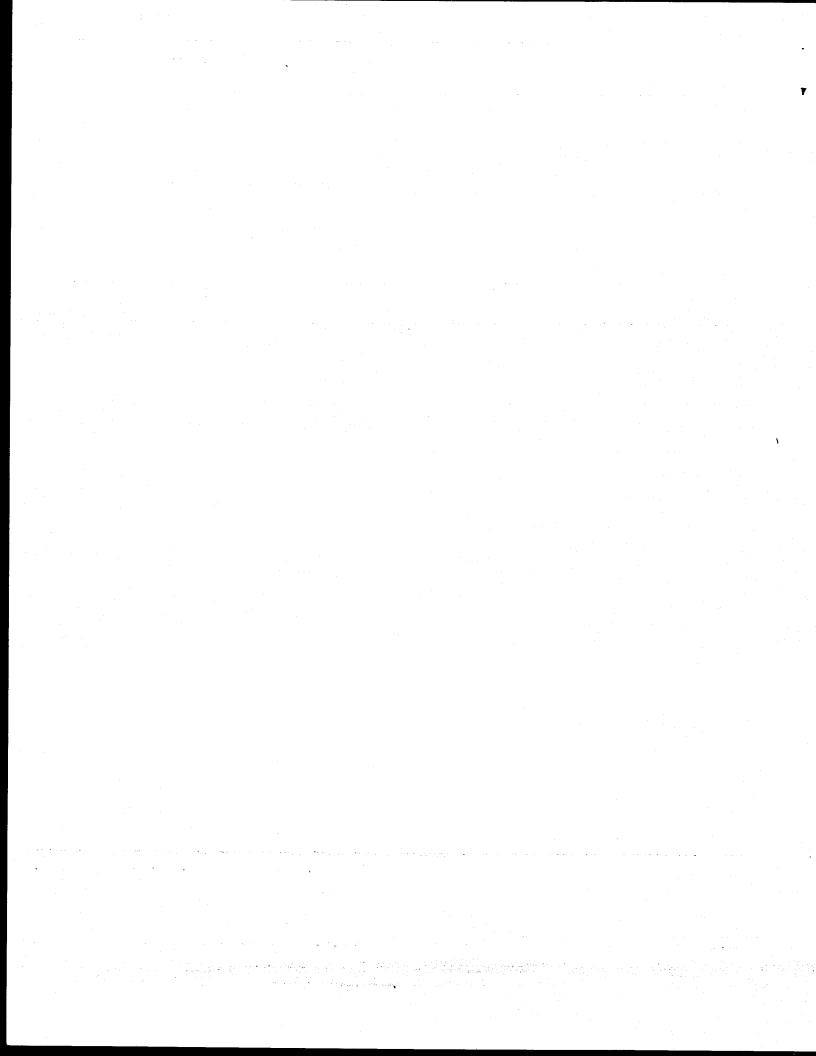# APPENDIX B.  AMENDMENT 1 TO THE BLACK SEA BASS FISHERY MANAGEMENT PLAN (ASMFC 2002)

August 19, 2002

*Fishery Management Report*

*of the*

*Atlantic States Marine Fisheries Commission*

Amendment 1 to the Interstate Fishery
Management Plan for Black Sea Bass

August 2002

# 1    EXECUTIVE SUMMARY

This Amendment to the Fishery Management Plan (FMP) for the Black Sea Bass fishery, prepared by the Mid-Atlantic Fishery Management Council (Council) and Atlantic States Marine Fisheries Commission (Commission), is intended to manage the black sea bass (*Centropristis striata*) fishery pursuant to the Magnuson-Stevens Fishery Conservation and Management Act of 1976 (MSFCMA), as amended by the Sustainable Fisheries Act (SFA) in 1996. This amendment is designed to revise the quarterly commercial quota system for black sea bass implemented in Amendment 9 to the Summer Flounder, Scup, and Black Sea Bass Fisheries Management Plan.

The management unit for black sea bass remains unchanged in this amendment. Specifically, the management unit is in US waters in the western Atlantic Ocean from Cape Hatteras, North Carolina northward to the US-Canadian border.

The objectives of the FMP are:

1. Reduce fishing mortality in the summer flounder, scup and black sea bass fishery to assure that overfishing does not occur.

2. Reduce fishing mortality on immature summer flounder, scup and black sea bass to increase spawning stock biomass.

3. Improve the yield from these fisheries.

4. Promote compatible management regulations between state and federal jurisdictions.

5. Promote uniform and effective enforcement of regulations.

6. Minimize regulations to achieve the management objectives stated above.

The following is a brief description of the management measures adopted by the Commission for the black sea bass fishery. These measures will be in place for 2003 and 2004, at which time their effectiveness will be evaluated and any changes to the management plan will be made (a complete description of the adopted management measures is in Section 7)

# Black Sea Bass Commercial Management

State-by-state allocations

The Summer Flounder, Scup and Black Sea Bass Management Board approved a state-by-state allocation program for 2003 and 2004 based on recent landings trends. The National Marine Fisheries Service will approve a coastwide black sea bass quota, which the states will allocate using the following percent shares:

| State | Percent of Coastwide Quota |
|---|---|
| Maine | .5 |
| New Hampshire | .5 |
| Massachusetts | 13 |
| Rhode Island | 11 |
| Connecticut | 1 |
| New York | 7 |
| New Jersey | 20 |
| Delaware | 5 |
| Maryland | 11 |
| Virginia | 20 |
| North Carolina | 11 |

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# 2    INTRODUCTION

The management measures implemented by this amendment will be in place for 2003 and 2004. The effectiveness of the program will be evaluated in preparation for the 2005 specification setting process, at which time the Commission and Council will determine if the program should be continued, modified or terminated. If the Commission and Council terminate this management program, or take no action, the commercial management measures described in Section 9.1.2.3.6 of the 1996 Black Sea Bass FMP will prevail beginning in 2005.

## 2.1    DEVELOPMENT OF THE PLAN

The black sea bass fishery is managed under the Summer Flounder (*Paralichthys dentatus*), Scup (*Stenotomus chrysops*) and Black Sea Bass (*Centropristis striata*) Fishery Management Plan (FMP) that was prepared cooperatively by the Mid-Atlantic Fishery Management Council (Council) and the Atlantic States Marine Fisheries Commission (Commission).

This amendment is designed to revise the quarterly commercial quota system for black sea bass implemented in Amendment 9 to the Summer Flounder, Scup, and Black Sea Bass Fisheries Management Plan.

## 2.2    PROBLEMS FOR RESOLUTION

This management program was approved to remedy a number of problems related to the commercial management system currently in place for black sea bass. Specifically, the quarterly quota system implemented in Amendment 9 was designed to allow for black sea bass to be landed during the entire 3 months in each quarter. However, the black sea bass fishery experienced early closures during the last three quarters in 1999 and 2000. In fact, in quarters 3 and 4 of 2000 the quarterly allocation was harvested within one month, leaving the fishery closed for the remaining two months of those quarters. In 2001, the quarters 1 through 4 also experienced early closures and quarter 3 of 2001 was closed in less than three weeks.

Long closures have obvious economic consequences to fishermen and processors. A market glut at the beginning of the quarter allows for a drop in prices as a large number of fish flood the market. After a short landings period, the fishery is closed and fishermen, especially those that fish primarily for black sea bass, are faced with the additional economic concerns of no or reduced income.

In addition to early closures, the quota in the first quarter was not taken in 1998, 1999, and 2000. This relates to the fact that the allocation percentages are based on historic landings during a period of time when the mesh size for summer flounder was smaller and the fishery was mixed, i.e., fishermen targeting summer flounder with 4" mesh landed significant quantities of black sea bass as bycatch from January

through March. As a result of the quota system and minimum mesh sizes for summer flounder, the flounder fishery is now very direct and fewer sea bass were landed in the winter fishery in 1999 and 2000.

Possible inequities were also been created by the current management system as landings have shifted to the north. In fact, preliminary data for quarter 4 in 2000 indicate that 41% of the landings for that quarter occurred in one state, Massachusetts. A shift in abundance of black sea bass to the north may account for these higher landings. However, some fishermen have also indicated that more restrictive possession limits have favored fishing operations in the north where black sea bass are caught closer to shore.

## 2.3    MANAGEMENT OBJECTIVES

The objectives of the FMP are:

1. Reduce fishing mortality in the summer flounder, scup and black sea bass fishery to assure that overfishing does not occur.

2. Reduce fishing mortality on immature summer flounder, scup and black sea bass to increase spawning stock biomass.

3. Improve the yield from these fisheries.

4. Promote compatible management regulations between state and federal jurisdictions.

5. Promote uniform and effective enforcement of regulations.

6. Minimize regulations to achieve the management objectives stated above.

## 2.4    MANAGEMENT UNIT

The management units for summer flounder, scup and black sea bass remain unchanged in this amendment. Specifically, the management unit is summer flounder in US waters in the western Atlantic Ocean from the southern border of North Carolina northward to the US-Canadian border, and scup and black sea bass in US waters in the western Atlantic Ocean from Cape Hatteras, North Carolina northward to the US-Canadian border.

## 2.5    MANAGEMENT STRATEGY

This amendment modifies the quota system for black sea bass by implementing a state-by-state allocation system for 2003 and 2004. This modification will allow for a more equitable allocation of the quota and increase the probability that exploitation targets will be met by allowing states to craft regulations that best meet the needs of their fishermen. The Council and Board intend to continue the management programs detailed in the black sea bass FMP to reduce overfishing and rebuild the black sea bass.

# 3       DESCRIPTION OF THE STOCK

## 3.1    SPECIES DESCRIPTION AND DISTRIBUTION

The following information on black sea bass range is taken directly from the document "FMP-EFH Source Document, Black Sea Bass: Life History and Habitat Requirements" (Steimle *et al.* 1999b). This document is referred to hereafter as the black sea bass EFH background document.

Black sea bass are basically warm-temperate in distribution, and usually strongly associated with structured, sheltering continental shelf and coastal habitats, such as reefs and wrecks. Black sea bass have been collected or reported from southern Nova Scotia and Bay of Fundy (Scott and Scott 1988) to southern Florida (Bowen and Avise 1990) and into the Gulf of Mexico. The management unit is black sea bass in the western Atlantic Ocean from the US-Canadian border southward to Cape Hatteras, North Carolina. South of there, black sea bass are managed by the South Atlantic Fishery Management Council. Beebe and Tee-Van (1933) also reported that they were once introduced to Bermuda; but the status of that introduction is unknown. Brown *et al.* (1996) reported that the summer migrant fish assemblage, that black sea bass is associated with, has also been reported from scattered sites on the Grand Banks of Canada; however, it is rarely found in the cool waters north of Cape Cod and into the Gulf of Maine (Scattergoode 1952, DeWitt *et al.* 1981, Short 1992). Over this wide distribution, the species is considered as three populations or stocks (northern, southern, Gulf of Mexico), with the northern stock, occurring north of Cape Hatteras, being the focus of this summary review. The life history and habitat uses of the southern and Gulf of Mexico populations, occurring south of Cape Hatteras, are covered in the Southeast Fishery Management Council's Snapper/Grouper FMP.

Beginning with the eggs and larvae of this species, they are generally collected on midshelf to coastal waters in the late spring to late summer (see below for details). Larvae are believed to settle in coastal waters and then as early juveniles move into estuarine or sheltered coastal nursery areas. Boehlert and Mundy (1988) suggest that this may be a two-step process of nearshore accumulation and estuarine passage. During the warmer months, juveniles are found in estuaries and coastal areas, and adults are found in slightly deeper coastal areas, between North Carolina and Massachusetts, often near some

kind of shelter. Adults summer in coastal areas, usually containing some structured habitat, along the Middle Atlantic Bight and into the Gulf of Maine. As coastal waters cool in the fall, the population gradually migrates south and offshore to winter on the slightly warmer outer continental shelf off and south of New Jersey. Temperature appears to be the limiting factor in black sea bass distribution, not the availability of structured habitat, north of Cape Cod. In Middle Atlantic Bight waters they are usually the most common fish found on these structured habitats, especially south of New Jersey where the abundance of cunner, *Tautogolabrus adspersus,* declines. These structured habitats have been reported to include shellfish (oyster and mussel) beds, rocky areas, shipwrecks and artificial reefs (Verrill 1873, Bigelow and Schroeder 1953, Musick and Mercer 1977, Steimle and Figley 1996).

One major distinguishing characteristic of the Middle Atlantic Bight population is that it migrates south and offshore to winter in deeper waters between central New Jersey and North Carolina, generally, as bottom water temperatures decline below about 57° F (14° C) in the fall. This population then migrates inshore to reside in southern New England and Middle Atlantic Bight coastal areas and bays as bottom waters warm again above about 45° F (7° C) in the spring (see juvenile and adult distribution discussions below for details). The southern population is not known to make this extensive migration but may move away from shallow coastal areas during periods of cold winter conditions, especially in the Carolinas. Larger fish are commonly found in deeper waters and usually associated with rough bottom (Smith 1907, Hildebrand and Schroeder 1928, Bigelow and Schroeder 1953). Black sea bass have been reported to attain lengths of over 24 inches (60 cm) and weights of 7.7 pounds (3.5 kg) or greater in the Middle Atlantic Bight (Bigelow and Schroeder 1953) and live to up to 20 years; these largest and oldest fish being almost always males.

As previously mentioned, one of the characteristics of this population of black sea bass is its seasonal migrations. The summer coastal population migrates in scattered aggregates in the fall (Musick and Mercer 1977) by generally unknown routes across the continental shelf from the inshore areas to the outer continental shelf wintering areas south of New Jersey as bottom temperatures decline. The locations of a time series of tag returns from adult fish tagged in Nantucket Sound, Massachusetts suggests that this local group of fish migrates directly south to the outer shelf near Block Canyon and moves southwest along this outer shelf zone to the vicinity of Norfolk Canyon, and returned by the same route (Kolek 1990). Offshore migrations are stimulated in the fall as coastal bottom water temperatures approach 45° F (7° C) and the return inshore migration begins in the spring (about April) as inshore bottom water temperatures rise above this 45° F (7° C) level (Nesbit and Neville 1935, June and Reintjes 1957, Colvocoresses and Musick 1984, Chang 1990, Shepherd and Terceiro 1994). Larger fish (again with a high proportion of males) begin migrating offshore sooner than smaller fish (Kendall 1977).

Black sea bass appear to be part of a migratory group of warm temperate species that are intolerant of colder inshore winter conditions. These migrant associate species can include scup, summer flounder, northern sea robin, spotted hake, butterfish and smooth dogfish (Musick and Mercer 1977,

Colvocoresses and Musick 1984). The composition of the seasonally migrating group that typically contains black sea bass is reported to vary inshore between spring-summer and fall (Phoel 1985). Any interactions among these species and their shared use of the habitat they transit are unknown, although juvenile-subadult black sea bass could be preyed upon by larger summer flounder and dogfish (see above). All other species, except butterfish, would be competitors for food and perhaps shelter, even if it were only a depression in the sediment or a exposed clam shell.

## 3.2    ABUNDANCE AND PRESENT CONDITION

The most recent assessment on black sea bass, completed in June 1998, indicates that black sea bass are over-exploited and at a low biomass level (SAW 27). Fishing mortality for 1997, based on length based methods, was 0.73. The complete assessment is detailed in the "Report of the 27th Northeast Regional Stock Assessment Workshop" (NEFSC 1998b).

The NEFSC has provided spring survey results for 2000. Amendment 12 to the Summer Flounder, Scup and Black Sea Bass FMP, which was partially approved by NMFS in 1999, established a biomass threshold based on this survey. Specifically, the biomass threshold is defined as the maximum value of a three-year moving average of the NEFSC spring survey catch-per-tow (1977-1979 average of 0.9 kg/tow).

Survey results indicate black sea bass biomass has increased in recent years; the 1999 value was the highest value in the series since 1979. However, the 1999 index is large because of a single tow that caught a large number of black sea bass in an area slightly north of Cape Hatteras. If that tow is removed from the estimate, the index drops from 0.433 to 0.093 for 1999.

Because of the potential influence of extremely small or large number for a single tow, Gary Shepherd (pers. comm.) has suggested that the survey indices be log transformed to give a better indication of stock status. The transformed series indicates a general increase in the exploitable biomass since 1993. The preliminary index for 2000 of 0.322 is the highest in the time series since 1976 and would substantiate fishermen's observations that black sea bass have become more abundant in recent years. The three-year moving average for 1998-2000 of 0.2011 is a 42% increase relative to the 1997-1999 average.

The spring survey can also be used as an index of recruitment. The survey indicates good year classes were produced from 1988 to 1992 (0.2 to 0.76 fish per tow), with a moderate year class in 1995, and poor year classes in 1993, 1994, 1996 and 1997. The 1999 index was about three times the average for the period 1968-1998 and the fourth largest value since 1968. Preliminary results for 2000 indicate a strong year class; the index is 1.135, the highest in the time series.

Relative exploitation based on the total commercial and recreational landings and the moving average of the transformed spring survey index indicates a significant reduction in mortality in 1998 and 1999 relative to 1996 and 1997 levels. Based on length frequencies from the spring survey, and assuming length of full recruitment at 25 cm, the average F based on two length based methods was 0.75 (48% exploitation rate) in 1998 (Shepherd pers. comm.). Length based estimates are very sensitive to changes in the length used for full recruitment; average F's were 0.51 (37% exploitation) or 1.25 (66% exploitation) if a length of 23 or 27 cm was used in the calculations. Based on the relative index, exploitation rates in 1999 were nearly identical to those estimated for 1998.

## 3.3    STOCK CHARACTERISTICS AND ECOLOGICAL RELATIONSHIPS

### 3.3.1    Spawning and early life history

Studies on age at maturity indicate that most black sea bass reach sexual maturity between ages 1 and 4 with 50% mature by age 2 (NEFSC 1993). The length at which 50% of the black sea bass are sexually mature is about 7.7 inches TL (NEFSC 1993).

The following discussion is taken from the black sea bass EFH source document. Like most of the Serranidae family, black sea bass are protogynous hermaphrodites. This means that most black sea bass function first as females, then undergo sexual succession and become functional males (Lavenda 1949). Cochran and Greir (1991) identified the hormonal changes that regulated this sexual succession or transformation in black sea bass.

In general, sex ratios favor females at smaller sizes and younger ages and males at larger sizes and older ages. Based on a compilation of several studies, the probability that a female black sea bass will undergo sexual transformation was greatest between 7 and 10 inches TL (Shepherd pers. comm.) (Table 1). In the Middle Atlantic Bight, individuals begin to become sexually mature at age 1 yr (8-17 cm TL), but it is not until they grow to about 19 cm SL (age 2-3 yrs) that about 50% of that size group are mature (O'Brien et al. 1993). A majority of this size-maturity threshold group are females (Mercer 1978). The average size at which sexual transformation from females to male occurs was reported to be between 10-13 inches (23.9-33.7 cm; Chesapeake Bay Program 1996). In the South Atlantic Bight, Cupka et al. (1973) reported that both sexes matured at smaller sizes, between 14 and 18 cm SL, in South Carolina waters. However, Wenner et al. (1986) and Alexander (1981) found mature fish at smaller sizes, i.e., about 4.0-4.4 inches (10-11 cm; age 1+) for South Carolina and New York populations, respectively, and a majority were mature at about 19 cm, again corresponding to an age of about 2-3 years, as was found for the Middle Atlantic population. Alexander (1981) reported a decrease in the age and size of sex change since the 1940s with fewer mature males in the population; he associated this decrease with increasing fishing pressure.

Based on collections of ripe fish and egg distributions, the species spawns primarily on the inner continental shelf between Chesapeake Bay and Montauk Pt., Long Island at depths of about 66-165 ft (20-50 m; Breder 1932, Kendall 1972, 1977, Musick and Mercer 1977, Wilk *et al.* 1990, Eklund and Targett 1990, Berrien and Sibunka in press), but eggs frequently occurred or spawning have been reported as far north as Buzzards Bay and Nantucket Sound, Massachusetts (Wilson 1889, Sherwood and Edwards 1902, Kolek 1990). Mercer (1978) reported that 2-5 yr old fish release between 191,000 and 369,500 eggs each. Some larvae have been collected in Cape Cod Bay but these were considered stragglers washed there through the Cape Cod Canal from Buzzards Bay and not the product of local spawning (MAFMC 1996b). Gravid females are not generally found in estuaries (Allen *et al.* 1978). Spawning in the Middle Atlantic population is generally reported in the late spring through mid-summer, May to July (Kendall 1972, 1977, Musick and Mercer 1977, Feigenbaum *et al.* 1989, Wilk *et al.* 1990, Eklund and Targett 1990) during inshore migrations, but can extend to October-November (Fahay 1983, Berrien and Sibunka in press). Larval distributions presented in Able *et al.* (1995a) suggest spawning is earliest off Virginia-North Carolina (in the vicinity of the wintering grounds) and progresses northerly and inshore as inner shelf waters warm.

Shepherd and Idoine (1993) noted that the complex social hierarchy of reef fishes during spawning, such as the temperate black sea bass, implies that the number of males may be an important factor limiting reproductive potential. They also noted, however, that theoretical studies suggested that the current relative abundance of males may not yet be limiting in the black sea bass population to the degree that non-dominant males participate in spawning. There are no known reported observations of the actual spawning activity and whether it is near the bottom or water surface. However, in Massachusetts coastal waters, spawning fish have been reported to aggregate on sand bottoms broken by ledges, and after spawning the fish disperse to ledges and rocks in deeper water (Kolek 1990, MAFMC 1996b). From tagging studies, Kolek (1990) reported evidence of spawning ground homing, as some tagged adult black sea bass returned annually to the same spawning grounds in northwestern Nantucket Sound. Kolek (1990) also reported this local spawning group spawned earlier and in shallower waters than generally reported (Kendall 1977). Although nothing is known of the mating of this species, distinct pairing is characteristic of the family (Breder and Rosen 1966).

Black sea bass produce colorless, buoyant eggs that are spherical and approximately 0.04 inches in diameter. Mercer (1978) derived fecundity relationships for 25 black sea bass collected in the Mid-Atlantic. The relationship between total fecundity (F - thousands of eggs) and total weight (W - grams) was:

$$F = -587.684 + 348.053 \ (\log W)$$

Fertilized black sea bass eggs hatch in approximately 75 hours at a temperature of 61° F. Wilson (1891) described the embryonic development of black sea bass and Kendall (1972) described black sea bass larvae.

### 3.3.2   Age and growth

Growth in mature black sea bass is sexually dimorphic, with faster growth but resulting in a lower maximum size in females (Lavenda 1949, Mercer 1978, Wilk et al. 1978). However, Shepherd and Idoine (1993) suggest that the species can have three possible sex-related growth rates: female, male, and transitional. Alexander (1981) found the males grew faster than females off New York based on otolith annuli analysis for year-1 or older fish. Dery and Mayo (1988), Kolek (1990) and Caruso (1995) reported that black sea bass from southern New England (Massachusetts) had growth rates almost double those reported for New York and Virginia, but different growth estimators were used; this observation is consistent with Mercer (1978) and Wenner et al. (1986) who noted that Middle Atlantic Bight fish at age were larger and grew faster than South Atlantic Bight fish. The long-term validity and habitat relationship of this observation is unknown at present. Growth is linear to about age 6, then slows; the Middle Atlantic population is larger at age than the South Atlantic population (Wenner et al. 1986).

Mercer (1978) aged 2905 black sea bass collected from commercial fisheries and trawl surveys in the Mid-Atlantic from 1973 to 1975. She found that back-calculated mean lengths almost doubled between ages 1 and 2 and then the rate of growth declined steadily thereafter (Table 2). She did not age any black sea bass older than 9 and larger, older fish were not well represented in the samples. Mercer (1978) also found significant differences in growth rates between male and female black sea bass.

Length-age data (all sexes combined) was fit to the von Bertalanffy growth equation. This equation, which relates age to length, is:

$$L_t = 469 \left(1 - e^{-0.182(t - 0.1056)}\right)$$

where $L_t$ is mean standard length (mm) at age t.

Most scientific publications report lengths of black sea bass in standard lengths. The standard length is the length of the fish from the tip of the snout to the posterior end of the hypural bone. However, most state regulations and the regulations pertaining to size in this FMP are in total length. Total length (TL), the length along the mid-line of the fish from the tip of the snout to the tip of the tail, can be derived from standard length using the following formula (Shepherd pers. comm.):

$$TL = 1.42076 \, (SL) - 30.5$$

where length is measured in millimeters.

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### 3.3.3 Length-weight relationship

Mercer (1978) developed length-weight relationships for black sea bass collected from the Mid-Atlantic Bight. Based on a sample of 2016 fish, the derived equation was:

$$\log w = -4.9825 + 3.1798 \, (\log l)$$

where weight (w) is in grams and length (l) is standard length in millimeters. Mercer (1978) also found significant differences between sexes with males heavier than females of the same length.

### 3.3.4 Mortality

The instantaneous natural mortality rate (M) is defined as annual losses experienced by black sea bass from all natural and anthropogenic factors except commercial and recreational fishing. The NEFSC assumed an M of 0.2 for black sea bass in the most recent stock assessment (NEFSC 1995).

The SAW-25 SARC concluded that there was inadequate information to pursue an age-based assessment at least for several years. Therefore, SAW-27 estimated fishing mortality during 1984-1997 was estimated using length-based methods. The Beverton and Holt (1956 in SAW-27) and Hoenig (1987 in SAW-27) method were both applied to length frequencies of the combined commercial and recreational landings and of the spring NEFSC survey. An $L_\infty$=66.3 , K=0.168, and length at recruitment of 9.4 inches (24 cm) were used in the estimations. Average annual fishing mortality, estimated from length-based analyses, ranged from 0.56 to 0.79 during 1984-1997 and was 0.73 (48 percent exploitation) in 1997.

### 3.3.5 Feeding and predation

According to Section 600.815 (a)(8) of the MFCMA, actions that reduce the availability of a major prey species, either through direct harm or capture, or through adverse impacts to the prey species' habitat that are known to cause a reduction in the population of the prey species may be considered adverse effects on a managed species and its EFH. The following sections on feeding and predation were taken from the black sea bass EFH source document.

### 3.3.5.1 Feeding

The diets of black sea bass larvae are poorly known and can be expected to be mostly zooplankton. Tucker (1989) reported that black sea bass larvae are capable of surviving and growing at lower prey densities and resist prey abundance fluctuations better then bay anchovy, *Anchoa mitchilli*, larvae.

Juvenile black sea bass are reported to be diurnal, visual predators and prey often on small benthic crustacea (isopods, amphipods, small crabs, sand shrimp, copepods) and other epi- or semi-benthic, estuarine-coastal taxa, such as mysids or smaller fish (Richards 1963a, Kimmel 1973, Allen *et al.* 1978, Werme 1981). Kimmel (1973) included polychaete worms as significant dietary items and reported a diet shift with juvenile growth, from mysids (55%) and amphipods (15%) at 1.2-3.5 inches (3.0-9.0 cm) SL to xanthid and other crabs (35%), mysids (19%) and polychaetes (14%) for 3.5-5.7 inches (9.1-14.6) cm SL sub-adults. Orth and Heck (1980) reported sub-adults (5.5-6.4 inches [14.0-16.5 cm] TL) using and feeding within eelgrass beds in lower Chesapeake Bay; prey were juvenile blue crabs, eelgrass fragments, isopods, caprellid amphipods, shrimp and pipefish, *Syngnathus* sp. Festa (1979) also reported various crabs (lady, blue and mud) and caridean shrimp as major diet items in a small sampling from a central New Jersey estuary. Allen *et al.* (1978) reported small bait fish (anchovies and silversides, *Anchoa* sp. and *Menidia* sp.) became most evident in the diets of southern New Jersey coastal-estuarine black sea bass between 4.3 inches and about 7.0 inches (11 cm and about 18 cm) lengths; but so did an increase in the occurrence of plant detritus, though crustacea were still the most common prey.

While on their summer habitat, adult black sea bass continue to feed on a variety of infaunal and epibenthic invertebrates (especially crustacea, including juvenile lobster) and small fish, and on pelagic squid and baitfish (Bigelow and Schroeder 1953, Miller 1959, Richards 1963a, Mack and Bowman 1983, Steimle and Figley 1996). Feeding was reported heaviest after spawning (Hoff 1970). The diets and feeding while the population is wintering offshore is poorly known. The potential benthic invertebrate macrofaunal prey in the wintering area is known to be variable and can be dominated by echinoderms (sand dollars and sea stars), molluscs such as razor clams, and polychaetes (Wigley and Theroux 1981, Steimle 1990). Some co-wintering guild species, e.g., scup (Austen *et al.* 1994), can be competitors for habitat or food. Other guild species, such as butterfish and squid, can be prey for adult black sea bass.

3.3.5.2 Predation

There are a multitude of potential larval black sea bass predators, and "jellyfish" can be a significant source of larval mortality when they are abundant in the coastal zone (Arai 1988).

Hartman and Brandt (1995) included black sea bass, presumably juvenile, in the summer diets of one year old weakfish, *Cynoscion regalis*, and other predators in Chesapeake Bay. Summer flounder, smooth dogfish and toadfish are potential demersal predators of juvenile black sea bass, and exposed juveniles can also be prey to piscivorous bluefish, *Pomatomus saltatrix*, striped bass, *Morone saxatilus,* weakfish and other predators that use the entire water column, including fish-eating diving birds. Steimle (unpub. data) found juvenile black sea bass in the stomachs of the following predators examined in Raritan Bay during the summer 1997: clearnose skate (*Raja eglanteria*), northern and striped sea robin (*Prionotus evolans*), summer flounder, spot, and possibly others (e.g., weakfish,

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bluefish, toadfish, smooth dogfish, and four-spot flounder, *Paralichthys oblongus*) whose stomachs contained small unidentified, partially digested fish, similar in size and shape to juvenile black sea bass.

The NEFSC food habits database lists the following as predators of black sea bass:  spiny dogfish, *Squalus acanthias*; Atlantic angel shark, *Squatina dumeril*; clearnose skate; little skate, *Raja erinacea*; spotted hake; summer flounder; windowpane, and goosefish, *Lophius americanus*.  This predation undoubtedly includes many sizes of black sea bass, but smaller fish are probably most vulnerable.

### 3.3.5.3 Parasites, diseases, injuries and abnormalities

Several different kinds of acanthocephalans, cestodes, and nemotodes have been found encysted in black sea bass digestive tracts (Linton 1901). Cupka *et al.* (1973) found that black sea bass collected from South Carolina waters were generally free of external parasites.

### 3.3.5.4 Overfishing definition

The Amendment 12 overfishing definition for black sea bass is when the fishing mortality rate exceeds the threshold fishing mortality rate of $F_{msy}$. Since $F_{msy}$ cannot be reliably estimated, $F_{max}$ is used as a proxy for $F_{msy}$. When an estimate of $F_{msy}$ is available, it will replace the proxy. $F_{max}$ is 0.32 under current stock conditions. The maximum value of the spring survey index based on a three year moving average (0.9 kg/tow), is a proxy for the biomass threshold. $B_{msy}$ cannot be reliably estimated for black sea bass (MAFMC 1998).

### 3.3.5.5 Probable future condition

The future condition of a stock is dependent upon the recruitment, growth, natural mortality and fishing mortality that the current stock is undergoing. The following paragraphs summarize the important parameters from the above discussion and project where the future stock will be in relation to the current fishery.

In addition, the advisory report on black sea bass from SAW-27 states that "recent catches are well below the historical average, age and size structure is truncated, and survey biomass indices since the late 1980s have been one-tenth of those observed in the late 1970s. Average annual fishing mortality, estimated from length-based analyses, ranged from 0.56 to 0.79 during 1984-1997 and was 0.73 (48 percent exploitation) in 1997. Recruitment in 1997, as indicated by survey indices, was well below the 1972-1996 average." The SARC-27 advisory report concluded that "in the absence of age-based estimate of current stock size (e.g., from virtual population analysis), a forecast of future stock was not possible. However, the existing fishing mortality rate reduction schedule, if effective, should result in increased survival for recruits leading to increases in stock biomass, if recruitment does not decrease." Additional, detailed information is available in the SAW-27 documents.

## 4    DESCRIPTION OF HABITAT

This section remains unchanged from the 1996 Black Sea Bass FMP. Reference Section 6, page 12.

# 5    DESCRIPTION OF THE FISHERIES

## 5.1    DOMESTIC COMMERCIAL FISHERY

Commercial landings of black sea bass have been recorded since the late 1800's. These data indicate that commercial landings north of Cape Hatteras varied around 6 million pounds from 1887 until 1948 when they increased to 15.2 million pounds (NEFSC 1992). Reported landings increased to a peak of 21.8 million pounds in 1952, declined to 1.4 million pounds in 1971 (Table 3), and in recent years have fluctuated between approximately 2 and 4 million pounds (Table 3). Commercial black sea bass landings have varied without trend since 1981, ranging from a low of 2.06 million lb in 1994 to a high of 4.33 million lb in 1984 (Table 3). The 1999 landings of 2.98 million lb were substantially below the peak landings estimated for 1952 (Table 3).

The distribution of commercial landings by state has fluctuated since 1950 (Table 3). However, Virginia has generally had the highest black sea bass landings with 42% of the total landings from Maine through North Carolina from 1950 through 1999, followed by New Jersey. Landings from North Carolina increased in relative importance to the coast in the early 1960's as compared to the early part of the time series. Likewise, New York landings have decreased in relative importance to the coast since the early part of the time series. Commercial landings by state have varied over recent years (Table 3). New Jersey had the highest average landings (33.5% of the average) from 1990 to 1999, with Virginia second (22.6%; Table 3). Virginia had the highest landings in 1998 and 1999. In addition, although Massachusetts has a 12" TL size limit for black sea bass, landings in that state almost doubled from 1998 to 1999 to around 574 thousand pounds making that state second in 1999.

Traditionally, two gears, fish otter trawls and fish pots/traps have accounted for the majority of commercial landings on a coastwide basis. These two gears accounted for about 85% of the landings from 1990 to 1999 (Table 4). Other important gear include hand lines (9%) and inshore and offshore lobster pots (nearly 2% combined).

Otter trawls, which harvested 40% of the black sea bass coastwide, accounted for the majority of the black sea bass landings in most states with the exception of Massachusetts, New Jersey, Delaware, and Maryland, from 1990 to 1999 (Table 5). Fish pots/traps accounted for a significant proportion of the landings from the remaining states. In addition, hand lines harvested a significant proportion of black sea bass in Massachusetts, Connecticut , New York, Virginia, and North Carolina (Table 5).

Due to a change in reporting requirements, the reporting of commercial landings by distance from shore is inconsistent from 1994-1998. Therefore, only 1999 landings are presented by distance from shore in this document. Earlier black sea bass landings by distance from shore are presented in Amendment 9. In 1999, 74.6% of the commercial landings of black sea bass were caught in the EEZ (Table 6). Of the states with reported landings Massachusetts had the lowest landings (0.5%) from the EEZ. Virginia

had the highest landings (99.7%) from the EEZ. The remainder of the states with reported landings caught the majority of their landings in the EEZ (Table 6).

Landings by month indicate that most black sea bass were harvested from January through June with peak landings in March and May, for the period 1990 to 1999 (Table 7). By state landings generally peaked in the winter months for all states except Massachusetts, New York, and Maryland. These states generally showed peaks in the summer months from April through August (Table 7).

## 5.2    DOMESTIC RECREATIONAL FISHERY

From 1981 to 1999 recreational landing have fluctuated between a high of 12.4 million pounds in 1986 to a low of 1.2 million pounds in 1998. During this time period the recreational sector accounted for 79% of the total black sea bass landings in 1982 to only 25% of the total black sea bass landings in 1984. Recreational fishermen landed 1.7 million pounds of black sea bass in 1999, accounting for 36% of the total black sea bass landings (Table 8). However, recreational landings were about 50% below the average value of 3.9 million pounds, from 1990 to 1999.

From 1990 to 1999, recreational trips directing for black sea bass in the Mid-Atlantic, New England, and South Atlantic Regions, ranged from a 219 thousand trips in 1992, to 315 thousand trips in 1995 (Table 9). Data of recreational fishing trips directed for black sea bass is not reported in the MRFSS statistics after 1997.

Over the past ten years (1990 to 1999) New Jersey accounted for the majority of recreational black sea bass landings (53.1% of the ten year total), followed by Virginia (20.3%), and North Carolina (5%; Table 10). The remainder of the states each accounted for less than 5.0% of the total recreational black sea bass landings from 1990 to 1999.

The majority of the black sea bass recreational landings came from the EEZ, from 1990 to 1999, in the Mid-Atlantic Region and North Carolina, with an average of 71.0% and 63.8%, respectively, of the landings from the EEZ (Table 11). During this time period, an average of 77.1% of the landings came from state waters in the North Atlantic Region.

In the North Atlantic Region and North Carolina, recreational landings of black sea bass were predominantly made by fishermen from private/rental boats (62.9% and 69.8% of the 1990 to 1999 average, respectively; Table 12). In the Mid-Atlantic Region recreational landings of black sea bass were predominantly made by fishermen on party/charter boats (66.5% of the 1990 to 1999 average).

VTR data for party/charter boats is only available from 1996 and later, when the requirement for a federal permit holder to submit a vessel logbook was implemented. VTR data indicate that black sea bass contributed almost 20% of the total catch (by number) made by party/charter vessels for the

1996-1999 period (Table 13). The contribution of black sea bass to the total catch of party/charter vessels fluctuated throughout the year, ranging from less than 10% in January, February, March, April, and August to almost 50% in November, with the largest proportion of black sea bass caught from May through December (Table 13). Analysis of the recreational landings by state indicates that the proportion of black sea bass to the total catch ranged from less than 1% to over 47%.

# 6    ECONOMIC CHARACTERISTICS OF THE FISHERY

Black sea bass is an important component of the commercial and recreational fisheries from North Carolina through Massachusetts. The economic characteristics of the commercial and recreational fishery for black sea bass is described below. Throughout this description, it is important to note the distinction between economic value and economic impact.

Economic value is a measure of willingness to pay for a good or service. Ex-vessel value in the commercial sector is thus a measure of processor and wholesaler willingness to pay for summer flounder, scup, or black sea bass in the dockside market. Likewise, retail value is a measure of final consumer willingness to pay for these species at supermarkets, seafood shops and restaurants. Economic impact, on the other hand, is a measure of expenditures made by people engaged in a particular activity, and the employment, income, tax revenues, etc. which result from these expenditures. Often, it is said that recreational fishermen spend "x" dollars on gear, boats, travel, etc., and generate "y" amount of employment or "z" dollars in tax revenue.

Clearly, this species is valuable to both recreational anglers and seafood consumers who do not or cannot fish for themselves. Also, individuals and firms engaged in the commercial harvesting, processing and marketing of black sea bass make expenditures and generate employment in the course of business activities, as do participants in the recreational fishery. This species has economic value in both recreational and commercial uses and these species related activities have economic impact in each use.

When considering the relative benefits of black sea bass to the two sectors, commercial values must be compared to recreational values and commercial impacts must be compared to recreational impacts. Unfortunately, recreational values are not easily measured and too often, economic impacts of recreational fishing are erroneously contrasted with ex-vessel value in the commercial sector. The reader is cautioned to avoid this confusion when impact and value estimates are presented in the following sections.

## 6.1 COMMERCIAL FISHERY

As a general rule, commercial fisheries are divided into three different components: harvesting, processing, and marketing. Different degrees of specialization and integration within each of these components exists among different fisheries. That is, many individuals and firms specialize in a single sector, although some vertically integrated companies span all sectors, and diversified companies are often involved in food related industries besides seafood. The intent of the following section is to examine each component in order to better understand these fisheries.

### 6.1.1 Harvesting sector

#### 6.1.1.1 Ex-vessel value and price

Commercial landings of black sea bass have decreased approximately 31% from 4.3 million pounds in 1984 to less than 3.0 million pounds in 1999. Commercial landings in 1999 were 16% above the 1998 landings and 5% above the 1990-1999 mean. The commercial share averaged 45% of the combined total landings of black sea bass from 1990-1999 (Table 8). Preliminary landings data indicates that less than 2.7 million pounds of black sea bass were landed in 2000.

The ex-vessel value of black sea bass landings increased from approximately $2.3 million in 1994 to over $5.0 million in 1999. In 2000, the commercial value of black sea bass was estimated at $4.7 million or 6% below the 1999 value. Inflation adjusted prices (2000 dollars) have ranged from $1.14 to $1.81 per pound for the 1991 to 2000 period. These prices have increased from $1.14/lb in 1993 to $1.79/lb in 2000 (Table 14).

The value of black sea bass landings relative to the value of total landings in 1999 and 2000 are presented in Table 15 In 2000, the contribution of black sea bass landings to the value of total landings varied for each state from 1% or less for most states to slightly over 1% in Delaware, Virginia, and North Carolina. The overall contribution of summer flounder landings to the total ex-vessel value from Maine to North Carolina was less than 0.5% in 2000. While some states experienced small percentage changes in the contribution of black sea bass value to the value of total landings from 1999 to 2000, Delaware experienced about a 3% reduction. However, the aggregate contribution associated with this species from Maine to North Carolina was virtually unchanged from 1999 to 2000.

At $1.81/lb, the average price (all sizes) of black sea bass reached a record high in inflation adjusted (2000) dollars in 1998 (Table 14). Adjusted prices for black sea bass have ranged from $1.19 to $1.81 per pound for the 1991 to 2000 period. In 2000, highest prices were received in North Carolina ($2.08/lb), Virginia ($2.06/lb), and New York ($1.90/lb). Coastwide, the average price of scup was $1.79 per pound in 2000 (Table 16).

Monthly landing and price data for black sea bass indicates that a supply - price relationship is observable on a monthly basis. Months with highest average ex-vessel prices tend to coincide with months of lowest landings, normally between June and September (Table 17). Prices received for black sea bass originating in EEZ waters were generally higher than for state waters for 1999-2000 (Table 18). The 2000 coastwide average ex-vessel price per pound for jumbo was $2.62, $2.04 for large, $1.47 medium, $1.05 for small, $10.3 for extra small, and $1.56 for unclassified landings (Table 19). Price differential in 2000 indicate that the ex-vessel price per pound for large black sea bass was approximately 95% greater than for small and extra small (pins).

6.1.1.2 Fishing vessel activity

Analysis of permit data indicates that in 2000 there were 1,969 vessels with one or more of the following three commercial or recreational federal northeast permits: summer flounder, black sea bass, and scup. A total of 1,033, 977, and 831 federal commercial permits for summer flounder, scup, and black sea bass, respectively, were issued to northeast region fishing vessels. For party/charter operators a total of 613, 498, and 528 federal permits were issued for summer flounder, scup, and black sea bass, respectively (section 3.5).

These three fisheries (summer flounder, scup, and black sea bass) have vessels permitted as commercial, recreational, or both. Of the 1,969 vessels with at least one federal permit there were 1,303 that held only commercial permits for summer flounder, scup, or black sea bass while there were 546 vessels that held only a recreational permit. The remaining vessels (120) held some combination of recreational and commercial permits. Whether engaged in a commercial or recreational fishing activity vessels may hold any one of seven combinations of summer flounder, scup, and black sea bass permits. The total number of vessels holding any one of these possible combinations of permits by species and commercial or recreational status are reported in Table 20

In addition to summer flounder, scup, and black sea bass there are a number of alternative commercial or recreational fisheries for which any given vessel might possess a federal permit. The total number of vessels holding any one or more of these other permits is reported in Table 21 Additional descriptive information for these permit holders is presented in section 3.5.

Table 22 presents the top commercial landing ports for summer flounder, scup, and black sea bass for 1999. Activity at the port level indicate that 57% of the total black sea bass commercial landings occurred in seven ports: Chatham and "Other Massachusetts", Massachusetts; Point Judith, Rhode Island; Cape May, New Jersey; Ocean City, Maryland; and Virginia Beach and Hampton, Virginia. The contribution of black sea bass to ports with 10% or more black sea bass dependence (value) is presented in Table 23 Of the seven ports accounting for the bulk of the black sea bass landings in 1999, only Virginia Beach (14.60%) and Ocean City (9.76%) had 10% or more revenue dependence on black sea bass (Table 23).

## 6.1.1.3 Fishing costs

Vessel costs are composed of ownership costs and operating costs. Ownership costs are incurred once the durable goods are purchased. These are added costs whether or not the assets (equipment/materials) are used in the production process, that is they remain constant regardless of the output level. Ownership costs are frequently referred to as "fixed costs." They include depreciation, debt, insurance, routine maintenance, and insurance, etc. Operating costs are incurred when the production process occurs. These costs are commonly known as "variable costs." They include fuel, oil, maintenance, wages, food, sale and unloading fees, etc.

Vessel variable costs are proportionate to the hours traveling and fishing (operating maintenance, fuel, ice) and the quantity of fish landed (wages, sales and unloading fees, ice). Costs vary in different locations and the cost components have changed over the years. Due to the variation in vessels landings, summer flounder, scup, and/or black sea bass (home port, tonnage class, directed fishery, etc.), exact cost information is difficult to obtain and generally applicable only to a hypothetical "average" vessel.

Wages are almost always in the form of a share or "lay" system. The captain, crew, and vessel owner split the net revenue based on a predetermined, set ratio. Ratios are in many instances set according to what is traditional in that port. The particular ratio of the lay system utilized varies between vessels. In some cases none of the trip expenses are paid by the crew but incurred by the boat. When this system is employed, the gross revenue is divided equally between the crew and the boat. This system is termed "Clear 50." On the other hand, trip expenses such as fuel, ice, and in some cases food are subtracted from the gross revenue with the remainder divided 50-50 between the crew and the boat. This system is termed "Broken 50." When one or the other of the parties is responsible for additional costs, the share split normally reflects this.

In the Northeast, diesel fuel has increased from approximately $0.96 per gallon in 1997 to $1.27 per gallon in 2000 (USDA 2001). However, fuel costs will vary throughout the year and among ports. Total vessel fuel costs are directly proportional to the amount of time spent steaming and fishing as well as the size and drag of the fishing gear used. Given the uncertainties of world oil markets, it is likely that fuel prices will fluctuate unpredictably from year to year.

Variable maintenance costs are related to the hours the engines, fishing gear, etc. are used and the weather conditions. Much of the minor repair work is conducted by crew members and, on larger vessels, by an engineer. Since these crew members perform their labor as part of their normal responsibilities there is no added labor cost (Crutchfield 1986). However, most major engine, electronics, and gear repairs are contracted to specialists.

In addition to the shares earned from the sale of fish, crews often receive bycatch as "shack" (Gates pers. comm.). This is fish which is not sold on the official vessel record and the gross receipts are divided among the captain and crew and, sometimes, the vessel owner. Shack varies by season, fishery, and port (Logan pers. comm.). Otter trawlers often shack all or part of the finfish catch when scalloping. No records exist to estimate shack so it is not possible to consider it separately from wages.

Over 95% of the landed black sea bass are harvested by three gear types: pots/traps for fish (46%), fish otter trawl gear (40%), and hand lines (9%) (Table 24).

The results of a survey of small Northeast fishing vessels (<65 feet in length) whose primary gear was otter trawl and reported landings in New England in 1996 was presented by Lallemand et. al. (1998). Even though the vessels in the survey had wide ranges in effort and in operating expenses, the vessel physical characteristics were very similar. The value most frequently reported for length (40 ft), gross ton (16 GRT), horsepower (300 hp), number of engines (1), crew size (2), and captain's age (38 years of age) are close to the respective reported means or averages. The age of the typical vessels was 17-years-old. The typical vessel value reported was $150,000 (mean of $142,726), however, a wide variation ($30,000 to $425,000) in vessel value was reported. Small otter trawlers indicated than when using secondary harvesting gear (other than otter trawl gear) they most likely catch squids late in the winter and early spring, lobsters early in summer and fall, and tuna in the summer.

Trip expenses were divided into eight categories (fuel, oil, ice, food and water, lumpers fees, supplies, consignment fees, and other expenses). The average total operating cost per trip for small trawlers in 1996 was $267. Fuel was the most significant expense, contributing with an average of $132/trip ($97/day), a median of $100/trip (or $100/day), and a standard deviation of $94/trip (or $26/day) (Tables 25 and 26). Trip expenses per year are presented in Table 27. Number of fishing trips by month, days absent by month, and steaming time by month are presented in Tables 28, 29, and 30, respectively.

The small trawler survey reported a total mean of $7,141/year for repair and maintenance. This represents the cost of routine repair and maintenance. Repair and maintenance cost for fishing and other gears was the largest component with 28% of the total, followed by maintenance (21%), engine (14%), other repair (12%), electronics (11%), tow wires (11%), and generator (3%).

Unusual expenses and unexpected repair costs ranging from $2,000 to $20,000 (mean $9,840) were reported. These costs are not likely to be made annually and probably represent major investments which will be amortized. Loan payments for small trawlers, have a mean of $873 and in most cases, are modest when compared to operating expenses and overhead costs. The mean average duration of the loan is 7 years at an 8.6% interest rate.

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The remuneration system of smaller trawlers in the survey indicated that 56% of the resonants implemented a Clear Lay system in 1996, 41% used a Broken System, and 3% used a daily rate system. As such, it is reasonable to conclude that on small trawlers, the gross revenues are shared equally between the crew and the vessel using a 50-50 ratio. In addition, the captains bonus averaged between 6% and 9% and it was deducted from either the gross or vessel revenues.

The small trawler survey indicated that large variations among vessels' overhead costs exist. Overhead costs were divided into the following categories: haul-out charges; fishing permit(s); other permit(s); mooring and dockage fees; insurance; association(s) fees; professional fees; office expenses; vehicle; taxes (property, fuel, etc.); and other charges. The largest mean values were associated with other charges ($9,300), insurance ($3,925), and haul-out charges ($2,904). These items accounted for the bulk of the total mean overhead cost of $14,650 (standard error of $1,456).

Gross revenue for small otter trawl vessels in the survey ranged from $60,000 to $475,000, and the mean revenue was $174,863 (standard error $28,233). Most of the larger gross revenues (>$200,000) were reported by vessels that were greater than 50 feet and fished distances greater than 80 miles from the principal port of landings.

The results of a survey of large Northeast fishing vessels (>65 feet in length) whose primary gear was otter trawl and reported landings in New England in 1997 was presented by Lallemand et. al. (1999). Even though the vessels in the survey had wide ranges in effort and in operating expenses, the vessel physical characteristics were very similar. The value most frequently reported for length (65 ft), gross ton (125 GRT), horsepower (675 hp), number of engines (1), crew size (4), and captain's age (55 years of age) are close to the respective reported means or averages. The age of the typical vessels was 20 years old. The typical vessel value reported was $800,000, however, a wide variation ($80,000 to $1,250,000) in vessel value was reported. Large otter trawlers indicated that when using secondary harvesting gear (other than otter trawl gear) they most likely catch invertebrates (squids and shrimp) late in the winter and early spring, pelagics in the fall and early winter, and other fish (i.e., summer flounder, monkfish, whiting) in the summer. In addition, flat fish and other than groundfish are still mainly caught using otter trawl bottom fishing gear.

Trip expenses were divided into eight categories (fuel, oil, ice, food and water, lumpers fees, supplies, consignment fees, and other expenses). The average total operating cost per trip for large trawlers in 1997 was $2,608. Fuel was the most significant expense, contributing with an average of $1,369/trip ($332/day), a median of $1,440/trip (or $341/day), and a standard deviation of $314/trip (or $38/day) (Tables 31 and 32). Trip expenses per year are presented in Table 33 Number of fishing trips by month, days absent by month, and steaming time by month are presented in Tables 34, 35, and 36, respectively.

The large trawler survey reported a total mean of $40,805/year for repair and maintenance. These represents the cost of routine repair and maintenance. Repair and maintenance cost for fishing and other gears was the largest component with 27% of the total, followed by other repair (22%), maintenance (20%), engine (13%), tow wires (8%), electronics (7%), and generator (4%). Unusual expenses and unexpected repair costs ranging from $1,800 to $50,000 (mean $16,404) were reported. These costs are not likely to be made annually and probably represent major investments which will be amortized. Loan payments for small trawlers, have a mean of $4,155. The mean average duration of the loan is 9 years at a 7.3% interest rate.

The remuneration system of large trawlers in the survey indicated that 6% of the resonants implemented a Clear Lay system in 1997, 94% used a Broken System, and 0% used a daily rate system. As such, it is reasonable to conclude that on large trawlers, after trip expenses are subtracted from gross revenues, the remainder is shared equally between the crew and the vessel using a 50-50 ratio. In addition, the captains bonus averaged between 4% and 9% and it was deducted from either the gross or vessel revenues.

The large trawler survey indicated that the variations among vessels overhead costs is smaller than that from smaller trawlers. Overhead costs for large trawlers were divided into the following categories: haul-out charges; fishing permit(s); other permit(s); mooring and dockage fees; insurance; association(s) fees; professional fees; office expenses; vehicle; taxes (property, fuel, etc.); and other charges. The largest mean values were associated with insurance ($30,337), other charges ($8,200), and haul-out charges ($14,283). These items accounted for the bulk of the total mean overhead cost of $55,141 (standard error of $3,412). Gross revenue for large otter trawl vessels in the survey ranged from $65,468 to $1,542,417, and the mean revenue was $564,915 (standard error $74,492).

Fishing costs for pound nets, fish traps, and hand line operations are much less than costs for otter trawlers (Norton *et al.* 1983). There are no studies addressing summer flounder, scup, or black sea bass fishing costs by type of gear. Fishing costs of commercial striped bass harvesters using fish traps and hook and line gear were developed by Norton *et al.* (1983). The design of floating traps allows for the harvesting of species such as black sea bass, scup, butterfish, squid and fluke. Fish trap fishermen typically use 70 ft vessels with major expenditures for wages (41%) followed by nets (15%) and taxes (14%). Hook and line fishermen typically use a small boat (17 ft average), have major expenses of wages (35%), fuel (16%), and tackle (16%), and in past years made much of their income from striped bass (Norton *et al.* 1983).

The cost of using hook and line gear to fish for groundfish in the Northeastern U.S. was presented by Georgianna and Cass (1998). A population of 234 vessels interviewed in 1997 (averaging 26 trips per year), indicated that the fleet spent $2,479,613 in operating costs in 1996. However, this figure underestimates total operating cost outlays by the fleet because hook boats fish for other species (than groundfish) or use other gear for a considerable amount of fishing time. Overhead cost was estimated

to be $2,981,137, $1,905,019 for mortgage, $1,154,557 for depreciation, and $3,266,349 for repairs and maintenance in 1996. The report indicates that most of these expenses were incurred in or near the vessel's home port.

Table 37 presents an estimated average annual operating costs for pot/trap vessels in 2000. These estimates are based on operating expenditures for the lobster fishery less bait and labor expenditures. While these costs are not specifically associated with pot/trap fishing for scup or black sea bass, they represent realistic approximations to the cost structure of those fisheries. The overall average annual operating costs for pot/trap vessels was $22,472 in 2000. The largest average operating cost was associated with fuel and lubricants with 29% of the total, followed by general maintenance (normal use) 19%, boat repair and maintenance (by owner) 15%, vehicles 15%, supplies (store) 14%, food 6%, boat repair and maintenance (by yard) 3%.

## 6.1.2 Processing, marketing, and consumption

NMFS unpublished processing survey data indicates that in 1999, one plant reported handling scup and two plants handled black sea bass. Information regarding production for these plants is confidential. However, the overall contribution of black sea bass to the total poundage processed and total value of the products processed of these plants was minimal, i.e., less than 0.5%. The overall contribution of scup to the total poundage processed and total value of the products processed for the one plant reporting scup processing in 1999 was also minimal, i.e., 0.6% and 0.3%, respectively. Most scup and black sea bass are sold fresh (Bergman and Ross pers. comm.). The catch is generally refrigerated or iced during long trips and might or might not be iced during short trips. When the catch arrives at the dock, it is sorted, washed, weighed, and boxed and iced for shipment. Scup and black sea bass might be frozen for future marketing when demand is low or when the market is glutted. When frozen, processing is minimal, mainly consisting of handling and freezing. Boxes containing scup and black sea bass for shipment typically weigh 100 pounds. However, higher value scup and black sea bass may be boxed in 50 and 60 pound cartons, respectively (McCauley pers. comm.).

Scup and black sea bass are generally transported to market by truck. The Fulton Fish Market in New York City is the primary wholesale outlet for scup (Finlayson and McCay 1994). Marketing channels for scup appear to be well established. Black sea bass is carried as a specialty item in the Fulton Fish Market in New York City, with supplies peaking during the spring and fall months, then decreasing during the summer, and reaching yearly lows during the winter months (Finlayson and McCay 1994).

Scup is generally a low priced fish. The greatest proportion of small scup go to dealers in Philadelphia, Washington, Baltimore and points south (Finlayson and McCay 1994). Some of the large scup marketed from Point Judith, Rhode Island are shipped to the Boston area (McCauley pers. comm.).

Finlayson and McCay (1994) reported that "black sea bass dealers in the Fulton Fish Market would pay and charge the highest prices for hook and line-caught fish, somewhat less for pot-caught fish, and the least for dragger-caught fish." This price differential appears to be associated with the quality and appearance of the product.

The greatest proportion of small black sea bass go to dealers in Philadelphia, Washington, Baltimore and points south (Finlayson and McCay 1994).

## 6.1.3 Economic impact of the commercial fishery

The economic impact of the commercial black sea bass fishery as it relates to employment and wages is difficult to determine given its nature. Since black sea bass represents 0.4% of the total value for all finfish and shellfish from North Carolina to Maine, it can be assumed that only a small portion of the region's fishing vessel employment, wages and sales is dependent on black sea bass (Table 38).

## 6.2 RECREATIONAL FISHERY

Recreational fishing contributes to the general well being of participants by affording them opportunities for relaxation, experiencing nature, and socializing with friends. The potential to catch and ultimately consume fish is an integral part of the recreational experience, though studies have shown that non-catch related aspects of the experience are often as highly regarded by anglers as the number and size of fish caught. Since equipment purchase and travel related expenditures by marine recreational anglers have a profound affect on local economies, the maintenance of healthy fish stocks and development of access sites is as important to fishery managers as the status of commercial fisheries.

Since 1979, the NMFS has conducted an annual MRFSS along the Atlantic coast. The survey is designed to provide estimates of the total bimonthly fishing effort (number of days fished), participation, and finfish catch by marine recreational anglers. The MRFSS consists of two independent yet complementary surveys: an intercept survey of marine anglers at fishing access sites and a random digit dial (RDD) telephone survey of coastal county households. Data from the intercept survey are primarily used to estimate mean catch-per-trip by species. Participation and effort are estimated using data acquired through the RDD survey of coastal households. The MRFSS distinguishes between fish available for identification and measurement by the interviewers (Type A), fish used as bait, filleted, or discarded dead (Type B1), and fish released alive (Type B2). The sum of types A, B1, and B2 comprise the total recreational catch, whereas types A and B1 constitute total recreational landings. It is worth noting that the recreational landings estimates are not comparable to commercial landings estimates because they include fish that are discarded dead.

### 6.2.1 Economic impact of the recreational fishery

Anglers' expenditures generate and sustain employment and personal income in the production and marketing of fishing-related goods and services. In 1998, saltwater anglers from Maine to Virginia spent an estimated $1.136 billion on trip-related goods and services (Steinback and Gentner 2001). Trip-related goods and services included expenditures on private transportation, public transportation, food, lodging, boat fuel, party/charter fees, access/boat launching fees, equipment rental, bait, and ice. Unfortunately, estimates of trip expenditures specifically associated with black sea bass were not provided in the study. However, if average trip expenditures are assumed to be constant across all fishing trips, an estimate of the expenditures associated with black sea bass can be determined by multiplying the proportion of total trips that targeted black sea bass (0.72%) by the total estimated trip expenditures from the Steinback and Gentner study ($1.136 billion). According to this procedure, anglers fishing for black sea bass from Maine to Virginia spent an estimated $883,354 on trip-related

goods and services in 2000.[1] Apart from trip-related expenditures, anglers also purchase fishing equipment and other durable items that are used for many trips (i.e., rods, reels, clothing, boats, etc.). Although some of these items may be purchased with the intent of targeting/catching specific species, the fact that these items can be used for multiple trips creates difficulty when attempting to associate durable expenditures with particular species. Therefore, only trip-related expenditures were used in this assessment.

The black sea bass expenditure estimate can be used to reveal how anglers' expenditures affect economic activity such as sales, income, and employment from Maine to Virginia. During the course of a fishing trip, black sea bass anglers purchase a variety of goods and services, spending money on transportation, food, boat fuel, lodging, etc. The sales, employment, and income generated from these transactions are known as the direct effects of anglers' purchases. Indirect and induced effects also occur because businesses providing these goods and services also must purchase goods and services and hire employees, which in turn, generate more sales, income, and employment. These ripple effects (i.e., multiplier effects) continue until the amount remaining in a local economy in negligible. A variety of analytical approaches are available for determining these impacts, such as input-output modeling. Unfortunately, a model of this kind was not available. Nonetheless, the total sales impacts can be approximated by assuming a multiplier of 1.5 to 2.0 for the Northeast Region. Given the large geographical area of the Northeast Region, it is likely that the sales multiplier falls within those values. As such, the total estimated sales generated from anglers that targeted black sea bass in 2000 was likely to be between $1.325 million ($883,354*1.5) and $1.767 million ($883,354*2.0). A similar procedure could be used to calculate the total personal income and employment generated from black sea bass anglers' expenditures, but since these multiplier values have been quite variable in past studies no estimates were provided here.

## 6.2.2 Value of the fishery to anglers

The value that anglers place on the recreational fishing experience can be divided into actual expenditures and non-monetary benefits associated with satisfaction (consumer surplus). Anglers incur expenses for fishing (purchase of gear, bait, boats, fuel, etc.), but do not pay for the fish they catch or for the enjoyment of many other attributes of the fishing experience (socializing with friends, contact with nature, etc.). Despite the obvious value of these attributes of the experience to anglers, no direct expenditures are made for them, hence the term "non-monetary" benefits.

Behavioral models that examine travel expenditures, catch rates, accessibility of fishing sites, and a variety of other factors affecting angler enjoyment can be used to estimate the "non-monetary" benefits

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[1] The 1998 estimate of expenditures ($817,920) was adjusted to its 2000 equivalent ($883,354) by using the Bureau of Labor Statistics Consumer Price Index.

associated with recreational fishing trips. Unfortunately, a model of this kind does not exist for black sea bass. Data constraints often preclude researchers from designing species-specific behavioral models. However, a recent study by Hicks, *et. al.* (1999) estimated the value of access across states in the Northeast region (that is, what people are willing to pay for the opportunity to go marine recreational fishing in a particular state in the Northeast) and the marginal value of catching fish (that is, what people are willing to pay to catch an additional fish). Table 39 shows, on average, the amount anglers in the Northeast states (except for North Carolina which was not included in the study) are willing to pay for a one-day fishing trip. The magnitude of the values in Table 39 reflect both the relative fishing quality of a state and the ability of anglers to choose substitute sites. The willingness to pay is generally larger for larger states, since anglers residing in those states may need to travel significant distances to visit alternative sites. Several factors need to be considered when examining the values in Table 39 First, note that Virginia has relatively high willingness to pay estimates given its relative size and fishing quality characteristics. In this study, Virginia defines the southern geographic boundary for a person's choice set, a definition that is arbitrary in nature. For example, an angler in southern Virginia is likely to have a choice set that contains sites in North Carolina. The regional focus of the study ignores these potential substitutes and therefore the valuation estimates may be biased upward (Hicks, *et. al.* 1999). Second, the values cannot be added across states since they are contingent upon all of the other states being available to the angler. If it was desirable to know the willingness to pay for a fishing trip within Maryland and Virginia, for example, the welfare measure would need to be recalculated while simultaneously closing the states of Maryland and Virginia.

Assuming the average willingness to pay values shown in Table 39 are representative of trips that targeted black sea bass, these values can be multiplied by the number of trips that targeted black sea bass by state (from the MRFSS data) to derive welfare values for black sea bass. Table 40 shows the aggregate estimated willingness to pay by state for anglers that targeted black sea bass in 2000 (i.e., the value of the opportunity to go recreational fishing for black sea bass). New Jersey, Virginia, and New York were the states with the highest estimated willingness to pay for black sea bass day trips. Once again, note that the values cannot be added across states since values are calculated contingent upon all of the other states being available to the angler.

In the Hicks *et. al.* (1999) study, the researchers also estimated welfare measures for a one fish change in catch rates for 4 different species groups by state. One of the species groups was "bottom fish," of which black sea bass is a component. Table 41 shows their estimate of the welfare change associated with a one fish increase in the catch rate of all bottom fish by state. For example, in New Jersey, it was estimated that all anglers would be willing to pay $2.01 (the 1994 value adjusted to its 2000 equivalent) extra per trip for a one fish increase in the expected catch rate of all bottom fish. The drawback to this type of aggregation scheme is that the estimates relate to the marginal value of the entire set of species within the bottom fish category, rather than for a particular species within the grouping. As such, it is not possible to estimate the marginal willingness to pay for a one fish increase in the expected catch rate of black sea bass from the information provided in Table 41

However, it is possible to calculate the aggregate willingness to pay for a 1 fish increase in the catch rate of bottom fish across all anglers. Assuming that anglers will not adjust their trip taking behavior when bottom fish catch rates at all sites increase by one fish, the estimated total aggregate willingness to pay for a one fish increase in the catch rate of bottom fish in 2000 was $76.092 million (total trips (33.228 million) x average per trip value ($2.29)). This is an estimate of the total estimated welfare gain (or loss) to fishermen of a one fish change in the average per trip catch rate of all bottom fish. Although it is unclear how much of this welfare measure would be attributable to black sea bass, the results show that bottom fish in general, in the Northeast, are a very valuable resource.

Although not addressed here, recreational fishing participants and nonparticipants may also hold additional intrinsic value out of a desire to be altruistic to friends and relatives who fish or to bequeath a fishery resource to future generations. A properly constructed valuation assessment would include both use and intrinsic values in the estimation of total net economic value. Currently, however, there have been no attempts to determine the altruistic value (i.e., non-use value) of black sea bass in the Northeast.

6.2.3   1990 survey of party and charter boats

This Section is unchanged from the 1996 Black Sea Bass FMP. Please reference Section 8.2.4, page 33.

6.3   INTERNATIONAL TRADE

Black sea bass occur primarily on the continental shelf of the north-west Atlantic, and there are no imports of this species into the US. International trade of black sea bass is relatively limited. In 1991 about 6,000 pounds valued at $14,377 were exported to Mexico, and in 1992 about 5,000 pounds valued at $11,766 were exported to Mexico, the Netherlands and Switzerland (Ross pers. comm.). These figures represent minimum export values. Given the export classification codes employed by the NMFS, it is possible that some black sea bass were exported under the "unclassified" species category.

7   FISHERY MANAGEMENT PROGRAM

This section will remain unchanged from the 1996 Black Sea Bass FMP with the exception of the section addressing commercial quota allocation (Section 9.1.2.3.6).

## 7.1 COMMERCIAL MANAGEMENT MEASURES

### 7.1.1 Commercial Quota

A state-by-state system to distribute and manage the annual commercial quota will be implemented by the Commission for 2003 and 2004. Under Amendment 13 to the Mid-Atlantic Fisheries Management Council Summer Flounder, Scup and Black Sea Bass Fishery Management Plan, a coastwide quota will be approved by NMFS without quarterly or seasonal breakdowns. Under the authority of this amendment, the states will then allocate this quota according to a negotiated formula (Table 42) based on their percentage share of historical commercial landings and current fishing trends (Table 43). States will be expected to adopt appropriate measures to prevent quota overages and to indicate these measures in their annual report to the Commission Management Board (Section 8). This alternative will not place an additional burden of federal monitoring on NMFS, as states will have the responsibility for implementing closures when their state-specific quota has been reached. Any state landings in excess of their annual quota will be deducted from that state's annual quota the following year.

Under this state-by-state quota system, states will be allowed to transfer or combine quotas during the year. In order for a quota transfer to occur, one state must request a quota transfer in writing from a state that has not landed its entire annual allocation. Should that state agree to such a transfer, that state must notify the requesting state and Commission of the total number of pounds that will be transferred. All quota transfers must take place during the fishing year to which they will apply.

These management measures will be in place for 2003 and 2004. The effectiveness of the program will be evaluated in preparation for the 2005 specification setting process, at which time the Commission and Council will determine if the program should be continued, modified or terminated. If the Commission and Council terminate this management program, or take no action, the commercial management measures described in Section 9.1.2.3.6 of the 1996 Black Sea Bass FMP will prevail beginning in 2005.

The coastwide quota will apply throughout the management unit, that is, in both state and federal waters. All black sea bass landed for sale in a state will be applied against the state's annual commercial quota regardless of where the black sea bass were harvested. Any overages of the commercial quota landed in a state will be deducted from that state's annual quota for the following year.

The Commission has also established compliance criteria as a part of the interstate management process (Section 8). These compliance criteria will require states to submit dealer reports to NMFS for state permitted dealers.

The Regional Administrator will close the EEZ to commercial fishing for black sea bass once the quota is landed. Each state will close its waters to commercial fishing for black sea bass when its share of the quota is landed.

This state-by-state quota system will allow for the most equitable distribution of the commercial quota to fishermen. Specifically, under this set of management measures, states will have the responsibility of managing their quota for the greatest benefit of the commercial black sea bass industry in their state. States will design allocation systems based on state specific landing patterns using possession limits and seasons to ensure a continuous and steady supply of product over the season for producers and/or a fair an equitable distribution of black sea bass to all fishermen who have traditionally landed black sea bass in their state. States will also have the ability to transfer or combine quota, increasing the flexibility of the system to respond to year to year variations in fishing practices or landings patterns.

## 7.2 Impacts of the Fishery Management Program

### 7.2.1 The Amendment relative to the National Standards

Section 301(a) of the MSFCMA states: "Any fishery management plan prepared, and any regulation promulgated to implement such plan pursuant to this title shall be consistent with the following National Standards for fishery conservation and management." The following is a discussion of the standards and how this amendment meets them:

### 7.2.1.1 National Standard 1 - Overfishing Definition

*"Conservation and management measures shall prevent overfishing while achieving, on a continuous basis, the optimum yield from each fishery for the United States fishing industry."*

This amendment does not modify the overfishing definitions for black sea bass. The overfishing definitions for black sea bass were addressed in Amendment 12, as follows:

Overfishing for black sea bass is defined to occur when the fishing mortality rate exceeds the threshold fishing mortality rate of $F_{msy}$. Because $F_{msy}$ cannot be reasonably estimated, $F_{max}$ is used as a proxy for $F_{msy}$. $F_{max}$ is 0.32 under current stock conditions. The maximum value of the spring survey index based on a three year moving average (0.9 kg/tow), would serve as a biomass threshold. $B_{msy}$ cannot be reliably estimated for black sea bass.

Amendment 13 does not make any changes to the existing overfishing definitions or rebuilding schedules. Therefore, the amendment is consistent with National Standard 1.

### 7.2.1.2 National Standard 2 - Scientific Information

*"Conservation and management measures shall be based upon the best scientific information available."*

The analyses in this amendment are based on the best scientific information available. Therefore, this amendment is consistent with National Standard 2.

### 7.2.1.3 National Standard 3 - Management Units

*"To the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination."*

Black sea bass managed as a single unit throughout its range, from Maine through North Carolina. Amendment 13 does not alter the management units. Therefore this amendment is consistent with National Standard 3.

### 7.2.1.4 National Standard 4 - Allocations

*"Conservation and management measures shall not discriminate between residents of different states. If it becomes necessary to allocate or assign fishing privileges among various United States fishermen, such allocation shall be (A) fair and equitable to all such fishermen; (B) reasonably calculated to promote conservation; and (C) carried out in such a manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges."*

This amendment was adopted to remedy problems with the current commercial black sea bass quarterly quota system. In addition to early closures, possible inequities have also been created by the current management system as landings have shifted to the north. As such, the amendment does not discriminate between residents of different states. In this amendment the Council adopted a system that would allocate the annual quota on a coastwide basis each year. Additionally, the states adopted a state-by-state allocation system that would allocate the coastwide quota to each state. After considerable debate, the Commission adopted allocation percentages that represented a compromise between the allocation percentages associated with the various base periods presented in the public hearing draft of Amendment 13. Specifically, they adopted the following allocations: Maine 0.5%, New Hampshire 0.5%, Massachusetts 13%, Rhode Island 11%, Connecticut 1.0%, New York 7%, New Jersey 20%, Delaware 5%, Maryland 11%, Virginia 20%, and North Carolina 11%.

Under this program, states will have the responsibility of managing their quota for the greatest benefit of the commercial black sea bass industry in their state. States can design allocation systems based on state specific landing patterns using possession limits and seasons to ensure a continuous and steady supply of product over the season for producers and/or a fair an equitable distribution of black sea bass

to all fishermen who have traditionally landed black sea bass in their state. States will also have the ability to transfer or combine quota, increasing the flexibility of the system to respond to year to year variations in fishing practices or landings patterns.

This alternative was chosen because a federal coastwide quota with a state-by-state allocation system managed by the Commission, will allow for the most equitable distribution of the commercial quota to fishermen without the additional burden of federal monitoring by NMFS. As such, this amendment is consistent with National Standard 4.

## 7.2.1.5 National Standard 5 - Efficiency

*"Conservation and management measures shall, where practicable, consider efficiency in the utilization of the fishery resources; except that no such measure shall have economic allocation as its sole purpose."*

The management program adopted in this amendment is intended to allow the fishery to operate at the lowest possible cost (e.g., fishing effort, administration, and enforcement) given the FMP's objectives. The objectives focus on the issues of administrative and enforcement costs by encouraging compatibility between federal and state regulations since a substantial portion of the fishery occurs in state waters. The management measures proposed in this amendment place no restrictions on processing, or marketing and no unnecessary restrictions on the use of efficient techniques of harvesting. Therefore the action is consistent with National Standard 5.

## 7.2.1.6 National Standard 6 - Variations and Contingencies

*"Conservation and management measures shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources, and catches."*

A federal coastwide quota with a state-by-state allocation system managed by the Commission, was chosen because it could allow for the most equitable distribution of the commercial quota to fishermen without the additional burden of federal monitoring by NMFS. Under this program, states can design allocation systems based on state specific landing patterns using possession limits and seasons to ensure a continuous and steady supply of product over the season for producers and/or a fair an equitable distribution of black sea bass to all fishermen who have traditionally landed black sea bass in their state. States will also have the ability to transfer or combine quota, increasing the flexibility of the system to respond to year to year variations in fishing practices or landings patterns. Thus, this program takes into account and allows for variations among, and contingencies in, fisheries, fishery resources, and catches. As such, this amendment is consistent with National Standard 6.

## 7.2.1.7 National Standard 7 - Cost and Benefits

*"Conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication."*

The management program was adopted in conjunction with the Commission, and developed to be compatible with, and reinforce the management efforts of the states and the Commission. The status quo EFH alternative was adopted because the other EFH alternatives were deemed not to be practicable (section 4.2 in Amendment 13 to the Summer Flounder, Scup and Black Sea Bass Fishery Management Plan: practicability analyses), i.e., the costs outweigh the expected benefits. As such, this amendment is consistent with National Standard 7.

## 7.2.1.8 National Standard 8 - Communities

*"Conservation and management measures shall, consistent with the conservation requirements of the Magnuson-Stevens Act (including the prevention of overfishing and rebuilding of over fished stocks), take into account the importance of fishery resources to fishing communities in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities."*

One of the purposes of this amendment is to revise the currently quarterly quota system which fails to allow black sea bass to be landed during the entire three months in each quarter. As such, the black sea bass fishery experienced early closures during the last three quarters in 1999 and 2000, and all four quarters in 2001. In fact, in quarters 3 and 4 of 2000 the quarterly allocation was harvested within one month, leaving the fishery closed for the remaining two months of those quarters. In 2001, the quarters 1 through 4, also experienced early closures. Quarter 3 of 2001 was closed in less than three weeks.

Long closures have obvious economic consequences to fishermen and processors, and the ports and communities that are dependent upon them. A market glut at the beginning of the quarter allows for a drop in prices as a large number of fish flood the market. After a short landings period, the fishery is closed and fishermen, especially those that fish primarily for black sea bass, are faced with the additional economic concerns of no or reduced income.

In addition to early closures, possible inequities have been created by the current management system as landings have shifted to the north. In fact, preliminary data for quarter 4 in 2000 indicate that 41% of the landings for that quarter occurred in one state, Massachusetts. A shift in abundance of black sea bass to the north may account for these higher landings. However, some fishermen have also indicated that more restrictive possession limits have favored fishing operations in the north where black sea bass are caught closer to shore.

The management program in this amendment, a federal coastwide quota with a state-by-state allocation system managed by the Commission, was chosen because it could allow for the most equitable distribution of the commercial quota to fishermen. Specifically, this preferred alternative should minimize economic burdens on communities created by the current quarterly quota system. Additionally, states can design allocation systems based on state specific landing patterns using possession limits and seasons to ensure a continuous and steady supply of product over the season for producers and/or a fair an equitable distribution of black sea bass to all fishermen who have traditionally landed black sea bass in their state. States are more familiar with the needs of their local constituents and communities. States will also have the ability to transfer or combine quota, increasing the flexibility of the system to respond to year to year variations in fishing practices or landings patterns. As such, this amendment is consistent with National Standard 8.

## 7.2.1.9 National Standard 9 - Bycatch

*"Conservation and management measures shall, to the extend practicable, (A) minimize bycatch and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch."*

This National Standard requires Councils to consider the bycatch effects of existing and planned conservation and management measures. Bycatch can, in two ways, impede efforts to protect marine ecosystems and achieve sustainable fisheries and the full benefits they can provide to the Nation. Bycatch can increase substantially the uncertainty concerning total fishing-related mortality, which makes it more difficult to assess the status of stocks, to set the appropriate optimal yield, define overfishing levels, and ensure that OYs are attained and overfishing levels are not exceeded. Bycatch may also preclude other more productive uses of fishery resources.

The term "bycatch" means fish that are harvested in a fishery, but that are not sold or kept for personal use. Bycatch includes the discard of whole fish at sea or elsewhere, including economic discards and regulatory discards, and fishing mortality due to an encounter with fishing gear that does not result in capture of fish (i.e., unobserved fishing mortality). Bycatch does not include fish released alive under a recreational catch-and-release fishery management program. A catch-and-release fishery management program is one in which the retention of a particular species is prohibited. In such a program, those fish released alive would not be considered bycatch.

Recent stock assessments for black sea bass indicate that the stock is overexploited. As a result, the black sea bass FMP is focused on reducing fishing mortality and rebuilding these stocks. The regulations are necessary to meet the conservation objectives of the FMP. Many of these management measures have associated discards. However, these regulations are necessary to achieve the principal goal of the MSFCMA - to halt overfishing and to rebuild over fished stocks.

The commercial fishery for black sea bass is primarily prosecuted with otter trawls, otter trawls and floating traps, and otter trawls and pots/traps, respectively. This fishery is managed principally through the specification of annual quotas. In addition, there are other management measures in place which would affect discard rates in the black sea bass fishery (e.g., minimum size regulation, mesh size/mesh thresholds, and possession limits).

An analysis of NMFS 1999 VTR data indicates that vessels which land summer flounder, scup, and black sea bass also harvest other species throughout the year. These fisheries are mixed fisheries, where squid, Atlantic mackerel, silver hake, skates, and other species are harvested with summer flounder, scup, and/or black sea bass. The contribution to total landings made by black sea bass (in addition to all other species landed) on trips targeting summer flounder, scup, or black sea bass is shown in Table 44. For trips that landed 100 or more pounds of black sea bass, black sea bass contributed 18.5% of the total landings (weight; Table 44). In the commercial fishery this data is

collected from commercial vessels that have permits to operate in federal waters as required by the FMPs or amendments for Summer Flounder, Scup, Black Sea Bass, Northeast Multispecies, Atlantic Mackerel, Butterfish, Squids, Dogfish, Bluefish, and Tilefish. Commercial vessels with a federal permit are required to report their activities when they engage in a fishery for one or more of the species mentioned above. Further characterization of catch, composition, and disposition in the directed summer flounder, scup, and black sea bass fisheries follow.

Based on further analysis of VTR data of trips keeping 100 pounds or more of black sea bass, 98% of the black sea bass were landed (Table 44). In these trips a total of 90 species were harvested in addition to black sea bass. The top ten species landed (by weight) had discard rates of approximately 3% or less with the exception of black sea bass (7.7%). Discard rates of over 10% were evident for several species, e.g., tautog (14.4%), sea robins (12.2%), blueback herring (33.3%), cunner (40.1%), and crab-unknown (96.2%). However, total catch for some of these species ranged from a few pounds to a few thousand pounds. As such, the total quantity discarded by weight for some of these species was small. Overall, 2% of the total weight harvested on these trips was reported as discarded.

Given the mixed fishery nature of the black sea bass fisher, discards of targeted species and/or incidental species will occur. Catch disposition from NMFS sea sampling data for these species for 1999 are shown on Table 45. This sea sampling data is the most complete at-sea observation data available to characterize commercial catch and discards in the summer flounder, scup, and black sea bass fisheries.

Analysis of sea sampling data for black sea bass based on a definition of a directed trip at 100 pounds indicated that about 45.3% of the black sea bass were landed (Table 45). The predominant species caught for these trips was Atlantic mackerel, accounting for 23.7 of the catch. A total of 23 species were harvested in addition to black sea bass in these trips. Approximately 55.9% of the total weight caught in these trips was discarded. Discard rates of over 50% were evident for most species. However, total catch for these species ranged from a few pounds to a few thousand pounds and, as such, the total quantity discarded by weight for some of these species was small.

The VTR and sea sampling discard data for and black sea bass are limited and/or contradictory. VTR data indicate discard estimates are minimal for all three species, i.e., less than 3%. Estimates from sea sample data indicate that nearly 55% of black sea bass were discarded. However, these estimates are based on samples that are limited in their temporal or geographical scope.

The nature of the data make it difficult to develop any definitive or reliable conclusions about discards for this fishery especially during the periods or in areas where sea sampling has not occurred. As such, it is difficult for the Council and Commission to modify or add management measures to further minimize discards if the data are not available to define the nature and scope of the discard problem or the data indicate that a discard problem does not exist.

The Council recognizes the need for improved estimates of discards for all of the fisheries managed under this FMP. The Council has requested increased at-sea sampling intensity over a broader temporal and geographical scope than is currently available.

The lack of discard data, for black sea bass has hampered the ability of the Council and Commission to respond to potential discard problems in the commercial fisheries. In fact, the lack of this data has been the primary reason cited by the SARC as to why an age based assessment cannot be developed for black sea bass. The collection of additional data by NMFS will allow the Council and Commission to more effectively respond to discard problems by changes in mesh, threshold and minimum size regulations or by implementing season and area closures in response to changes in fishermen behavior or an increased level of discards.

There are also a significant recreational fisheries for black sea bass. A high portion of the black sea bass that are caught are released after capture. It is estimated that 25% of the black sea bass that are caught and released by anglers die after release, i.e, the majority of the fish are released alive and are expected to survive after release. The fish that survive are not defined as bycatch under the SFA. The Council and Commission believe that information and education programs relative to proper catch and release techniques for black sea bass and other species caught by recreational fishermen should help to maximize the number of these species released alive.

Current recreational management measures could effect the discards of black sea bass. These measures include a possession limit, size limit, and season. The effects of the possession limit would be greatest at small limits and be progressively less at higher limits. The size limit would have similar effects but the level of discarding will be dependent upon the levels of incoming recruitment and subsequent abundance of small fish. Seasonal effects would differ depending on the length of the season and the amount of black sea bass caught while targeting other species.

Minimum size limits, bag limits and seasons have proven to be effective management tools in controlling fishing mortality in the recreational fishery. A notable example is the recent success in the management of the Atlantic coast striped bass fishery. The recreational striped bass fishery is managed principally through the use of minimum size limits, bag limits and seasons. When these measures were first implemented, release rates in the recreational striped bass fishery exceeded 90%. However, the quick and sustained recovery of the striped bass stock after implementation of these measures provides evidence of their effectiveness in controlling fishing mortality in recreational fisheries.

The Council and Commission can currently implement annual changes in commercial and recreational management measures in response to changes in fishermen behavior or an increased level of discards, through the annual specifications process. Currently, the Council and Commission have implemented gear restricted areas through their annual specification process to minimize scup discards in the small mesh fisheries. The Council also funded research to identify gear modifications that reduce the bycatch

of scup in small mesh fisheries. In addition, the framework adjustment procedure implemented in Amendment 12 can be used to allow the Council and Commission to respond quickly to changes in the fishery through the implementation of new management measures or the modification of existing measures. As such, the Council also feels that

The management system proposed in this FMP represents the most effective tool for managing the black sea bass fishery. It is intended to distribute black sea bass landings throughout the year. In distributing black sea bass landings throughout the year, it is less likely that seasonal closures will occur in the commercial black sea bass fishery. Therefore, when black sea bass are caught in the directed and mixed trawl fisheries, they will not have to be discarded. Therefore the amendment is consistent with National Standard 9.

## 7.2.1.10    National Standard 10 - Safety at Sea

*"Conservation and management measures shall, to the extent practicable, promote the safety of human life at sea."*

The black sea bass fishery management system in this amendment was designed to eliminate derby style fishing for black sea bass. Landings will be controlled by the states and allocated over the year. The measures in this amendment should not affect the vessel operating environment or gear loading requirements. The Council and Commission developed this amendment with the consultation of industry advisors to help ensure that this was the case. In summary, the Council and Commission has concluded that the proposed amendment will not impact or affect the safety of human life at sea. Therefore the amendment is consistent with National Standard 10.

## 7.2.2    Biological Impacts

The management program implemented by this amendment is a coastwide quota allocated to each state by the Commission. This alternative was chosen because a federal coastwide quota with a state-by-state allocation system managed by the Commission could allow for the most equitable distribution of the commercial quota to fishermen without the additional burden of federal monitoring by NMFS. Because of the states' ability to tailor management measures to the needs of their fishery, this system should reduce the likelihood of derby-style fishing and the associated biological and ecological impacts as described in section 2.2. Additionally, this alternative may be more effective at constraining landings to the commercial quota thereby increasing the likelihood that the target exploitation rate would be met. Achieving the target exploitation rates would allow for stock rebuilding to continue on schedule. In addition, distributing landings evenly throughout the year should reduce the negative impacts to the stocks of non-target species that may occur under the current system. As such, this management program is likely to result in positive biological impacts relative to the current quarterly coastwide quota system.

## 7.2.3  Economic Impacts

A coastwide quota system without quarterly or seasonal breakdowns, will likely exacerbate the current problems that the fishery is experiencing because controls to regulate landings throughout the year would be lacking. A coastwide quota system will likely increase derby-style fishing and amplify the "use it or lose it" mentality which could lead to harvesting the quota quickly, thus creating early fishery closures, market gluts, and inequities among owners of different sized vessels and in different geographic locations. Long closures have obvious economic consequences to fishermen and processors. A market glut at the beginning of the year allows for a drop in prices as a large number of fish flood the market. After a short landings period, the fishery is closed and fishermen, especially those that fish primarily for black sea bass, are faced with the economic concerns of decreased annual revenues.

A federal coastwide quota with a state-by-state allocation system managed by the Commission could allow for the most equitable distribution of the commercial quota to fishermen without the additional burden of federal monitoring by NMFS. As such, it is expected that this program will benefit each state's fishery. A state-by-state quota system will allow for the most equitable distribution of the commercial quota to fishermen. Under this alternative, states will have the responsibility of managing their quota. States can design allocation systems based on possession limits and seasons to ensure a continuous and steady supply of product over the season for producers and/or a fair an equitable distribution of black sea bass to all fishermen who have traditionally landed black sea bass in their state. Thus, this system may reduce the likelihood of derby-style fishing effort and the associated economic impacts as described in section 2.2 Additionally, there will be long-term economic gains associated with stock rebuilding.

Overall, this program is likely to result in positive economic impacts relative to the management program described in Section 9.1.2.3.6 of the 1996 Black Sea Bass FMP..

## 7.2.4  Social and Community Impacts

A federal coastwide quota with a state-by-state allocation system managed by the Commission, is expected to allow for the most equitable distribution of the commercial quota to fishermen without the additional burden of federal monitoring by NMFS. This system allows states to design management measures that allow their fisheries to operate in critical periods that occur because of market conditions or the availability of black sea bass to their industry. States will design allocation systems based on possession limits and seasons to ensure a continuous and steady supply of product over the season for producers and/or a fair and equitable distribution of black sea bass to all fishermen who have traditionally landed black sea bass in their state. Thus, this program is likely eliminate derby-style fishing, and promote safety at sea. Seasonal closures should be less likely, thus eliminating the social

burdens associated with little or no income. This program should make it possible to meet specific cultural and social needs of each states' black sea bass commercial fishery.

This program may create confusion among fishermen that are in adjacent ports and have different regulations. The state-by-state allocations may also create difficulties in the monitoring of quota in states with small allocations.

Overall, this program is likely to result in positive social impacts relative to the management program it replaces.

## 7.2.5 Effects on Protected Species

Black sea bass are primarily landed by fish pots/traps, bottom and midwater trawls, and lines (Table 46). The Mid-Atlantic pot/trap and mixed trawl fisheries are Category III fisheries as defined in the NMFS 2001 List of Fisheries. This means that these fisheries have a remote likelihood or no known serious injuries or mortalities of marine mammals. All fishing gear are required to meet gear restrictions under the LWTRP, HPTRP, MMPA, and ESA.

## 7.2.6 Effects on Landings Patterns

This management program may result in changes in landings patterns along the coast. For example, if landings are decreased in some states and increased in other states, it is possible that fishing effort could follow the same pattern. However, this program is not expected to change overall commercial quota or fishing effort. This program is expected to be more effective at constraining landings to the annual commercial quota, than the current system. By constraining landings to the annual commercial quota, this program may result in an overall decrease in effort. As such, this management program is not expected to change existing impacts on protected species (section 7.1.1.4) relative to the management measures it replaces.

## 8    COMPLIANCE

The Commission has established compliance criteria as a part of the interstate management process for summer flounder, scup, and black sea bass. This Amendment only modifies the compliance criteria that pertain to the black sea bass commercial fishery. The following compliance criteria that are listed in the previous amendments will remain unchanged:

-Commercial size limits and mesh requirements
-Commercial quota provisions
-Commercial fishery closure ability
-Recreational harvest limit

-Permit and reporting requirements
-Area closures
-Gear restrictions

## 8.1 COMPLIANCE REPORTING CONTENTS AND SCHEDULES

The Compliance reporting requirements will remain unchanged relative to Amendment 12 to the Summer Flounder, Scup, and Black Sea Bass FMP.

## 8.2 PROCEDURES FOR DETERMINING COMPLIANCE

Procedures for determining a state's compliance with the provisions of an FMP are contained in section 7 of the Interstate Fisheries Management Program Charter (ASMFC 2001). The following compliance determination will be done in addition to the Summer Flounder, Scup, and Black Sea Bass FMP Monitoring Committee activities. The following represents compliance determination procedures as applied to this plan:

The Plan Review Team (PRT) will continually review the status of state implementation, and advise the Management Board any time that a question arises concerning state compliance. The Plan Review Team will review annual state compliance reports and prepare a compliance review for the Management Board summarizing the status of the fishery and any compliance recommendations on a state-by-state basis.

Upon review of a report from the PRT, or at any time by request from a member of the Management Board, the Management Board will review the status of an individual state's compliance. If the Management Board finds that a state's regulatory and management program fails to meet the requirements of this section, it may recommend that the state be found out of compliance. The recommendation must include a specific list of the state's deficiencies in implementing and enforcing the FMP and the actions that the state must take in order to come back in compliance.

If the Management Board recommends that a state be found out of compliance, it shall report that recommendation to the ISFMP Policy Board for further review.

The Policy Board shall, within 30 days of receiving a recommendation of non-compliance from a Management Board/Section, review that recommendation of non-compliance. If it concurs in the decision, it shall recommend at that time to the Commission that a State be found out of compliance.

The Commission shall consider any recommendation as quickly as possible and within 30 days of receipt. Any State which is the subject of a recommendation for a finding of non-compliance shall be given an opportunity to present written and/or oral testimony concerning whether it should be found out

of compliance. If the Commission agrees with the recommendation of the Policy Board, it may determine that a State is not in compliance with the relevant fishery management plan, and specify the actions the State must take to come into compliance. Upon a non-compliance determination, the Executive Director shall within ten working days notify the State, the Secretary of Commerce, and the Secretary of the Interior of the Commission's determination.

## 8.3 ADAPTIVE MANAGEMENT PROCESS

The Commission will participate in the Amendment to allocate the commercial quota to the states and implement other commercial management measures.

In accordance with the Commission's Interstate Fisheries Management Program Charter, each FMP may provide for changes within the management program to adapt to changing circumstances. Changes made under adaptive management shall be documented in writing through addenda to the FMP. The Management Board shall in coordination with each relevant state, utilizing that states established public review process, ensure that the public has an opportunity to review and comment upon proposed adaptive management changes. The states shall adopt adaptive management changes through established legislative and regulatory procedures. However, the states may have a range of procedures and time frames available for the adjustment and implementation of fishery regulations.

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## Table 1  The probability that a female black sea bass will transform to a male by size.

| SL (cm) | TL (in) | Probability of Transition |
|---|---|---|
| 7 | 2.7 | 0.000 |
| 8 | 3.3 | 0.010 |
| 9 | 3.8 | 0.015 |
| 10 | 4.4 | 0.025 |
| 11 | 4.9 | 0.050 |
| 12 | 5.5 | 0.072 |
| 13 | 6.1 | 0.100 |
| 14 | 6.6 | 0.125 |
| 15 | 7.2 | 0.145 |
| 16 | 7.7 | 0.150 |
| 17 | 8.3 | 0.151 |
| 18 | 8.9 | 0.152 |
| 19 | 9.4 | 0.152 |
| 20 | 10.0 | 0.150 |
| 21 | 10.5 | 0.140 |
| 22 | 11.1 | 0.130 |
| 23 | 11.7 | 0.120 |
| 24 | 12.2 | 0.110 |
| 25 | 12.8 | 0.095 |
| 26 | 13.3 | 0.080 |
| 27 | 13.9 | 0.060 |
| 28 | 14.5 | 0.045 |
| 29 | 15.0 | 0.035 |
| 30 | 15.6 | 0.030 |
| 31 | 16.1 | 0.025 |
| 32 | 16.7 | 0.020 |
| 33 | 17.3 | 0.015 |
| 34 | 17.8 | 0.010 |
| 35 | 18.4 | 0.005 |
| 36 | 18.9 | 0.002 |
| 37 | 19.5 | 0.001 |
| 38 | 20.0 | 0.000 |

Source: Gary Shepherd pers. comm.

**Table 2  The mean back-calculated lengths (TL inches) at age for black sea bass collected from the Mid-Atlantic, 1973-75.**

| | | | | | Age (Years) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | N | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Male | 972 | 3.7 | 8.0 | 10.6 | 12.4 | 14.2 | 16.4 | 18.2 | 19.2 | 20.3 |
| Female | 1797 | 3.8 | 7.9 | 10.2 | 12.0 | 13.4 | 14.4 | 17.6 | | |
| Combined | 2905 | 3.7 | 8.0 | 10.4 | 12.2 | 13.9 | 15.7 | 18.2 | 19.2 | 20.3 |

# Table 3. Commercial landings ('000 lbs) of black sea bass, 1950-1999.

| YEAR | ME | NH | MA | RI | CT | NY | NJ | DE | MD | VA | NC* | Total |
|------|-----|-----|------|------|------|-------|--------|------|------|--------|--------|---------|
| 1950 | 0 | 0 | 49 | 327 | 100 | 1,898 | 4,564 | 2 | 395 | 5,311 | n/a | 12,646 |
| 1951 | 0 | 0 | 104 | 725 | 61 | 2,792 | 5,658 | 0 | 321 | 8,772 | n/a | 18,433 |
| 1952 | 0 | 0 | 134 | 656 | 52 | 1,680 | 9,207 | 1 | 279 | 9,778 | n/a | 21,787 |
| 1953 | 0 | 0 | 81 | 459 | 40 | 1,096 | 5,829 | 0 | 214 | 6,657 | n/a | 14,376 |
| 1954 | 0 | 0 | 132 | 304 | 60 | 1,261 | 5,029 | 0 | 166 | 4,383 | n/a | 11,335 |
| 1955 | 0 | 0 | 141 | 437 | 143 | 936 | 4,134 | 0 | 229 | 5,291 | n/a | 11,311 |
| 1956 | 0 | 0 | 74 | 413 | 24 | 510 | 4,207 | 0 | 230 | 6,111 | n/a | 11,569 |
| 1957 | 0 | 0 | 119 | 334 | 216 | 809 | 3,636 | 0 | 205 | 4,202 | n/a | 9,521 |
| 1958 | 0 | 0 | 81 | 376 | 48 | 842 | 4,227 | 0 | 252 | 5,730 | n/a | 11,556 |
| 1959 | 0 | 0 | 62 | 183 | 37 | 612 | 3,739 | 0 | 157 | 3,268 | n/a | 8,058 |
| 1960 | 0 | 0 | 64 | 210 | 36 | 524 | 2,206 | 0 | 128 | 3,669 | n/a | 6,837 |
| 1961 | 0 | 0 | 51 | 170 | 42 | 313 | 1,497 | 0 | 139 | 3,211 | n/a | 5,423 |
| 1962 | 0 | 0 | 48 | 146 | 30 | 524 | 2,621 | 0 | 339 | 4,127 | 287 | 8,122 |
| 1963 | 0 | 0 | 17 | 114 | 29 | 576 | 2,812 | 0 | 304 | 4,316 | 204 | 8,372 |
| 1964 | 0 | 0 | 10 | 151 | 28 | 501 | 2,195 | 0 | 293 | 3,752 | 120 | 7,050 |
| 1965 | 0 | 0 | 11 | 98 | 24 | 382 | 2,146 | 0 | 243 | 4,771 | 274 | 7,949 |
| 1966 | 0 | 0 | 2 | 90 | 19 | 221 | 961 | 0 | 212 | 1,886 | 217 | 3,608 |
| 1967 | 0 | 0 | 6 | 48 | 1 | 110 | 816 | 0 | 154 | 1,410 | n/a | 2,545 |
| 1968 | 0 | 0 | 9 | 42 | 1 | 67 | 539 | 0 | 124 | 1,598 | 259 | 2,639 |
| 1969 | 0 | 0 | 7 | 34 | 0 | 69 | 392 | 0 | 147 | 1,770 | n/a | 2,419 |
| 1970 | 0 | 0 | 20 | 55 | 1 | 70 | 308 | 0 | 202 | 1,482 | n/a | 2,138 |
| 1971 | 0 | 0 | 19 | 39 | 1 | 55 | 308 | 30 | 140 | 658 | 102 | 1,352 |
| 1972 | 0 | 0 | 40 | 46 | 0 | 44 | 423 | 40 | 228 | 782 | 70 | 1,673 |
| 1973 | 0 | 0 | 54 | 34 | 1 | 105 | 694 | 80 | 207 | 1,282 | 75 | 2,532 |
| 1974 | 0 | 0 | 132 | 69 | 1 | 98 | 778 | 80 | 237 | 860 | 96 | 2,351 |
| 1975 | 0 | 0 | 144 | 174 | 4 | 131 | 1,176 | 180 | 349 | 1,546 | 347 | 4,051 |
| 1976 | 0 | 0 | 174 | 250 | 4 | 272 | 1,464 | 150 | 296 | 822 | 288 | 3,720 |
| 1977 | 0 | 0 | 104 | 176 | 2 | 232 | 1,487 | 220 | 459 | 1,696 | 1,065 | 5,441 |
| 1978 | 0 | 0 | 135 | 177 | 6 | 168 | 829 | 160 | 427 | 1,762 | 909 | 4,573 |
| 1979 | 0 | 0 | 137 | 234 | 1 | 123 | 600 | 60 | 356 | 1,226 | 682 | 3,419 |
| 1980 | 0 | 0 | 91 | 162 | 1 | 204 | 471 | 48 | 203 | 975 | 633 | 2,788 |
| 1981 | 0 | 0 | 132 | 168 | 3 | 123 | 423 | 57 | 203 | 806 | 598 | 2,513 |
| 1982 | 0 | 0 | 176 | 312 | 3 | 61 | 679 | 80 | 152 | 749 | 413 | 2,625 |
| 1983 | 7 | 0 | 254 | 674 | 10 | 77 | 856 | 70 | 181 | 1,038 | 170 | 3,337 |
| 1984 | 0 | 0 | 420 | 563 | 12 | 161 | 826 | 84 | 245 | 1,392 | 630 | 4,333 |
| 1985 | 0 | 0 | 312 | 671 | 13 | 132 | 643 | 92 | 221 | 606 | 731 | 3,421 |
| 1986 | 0 | 0 | 418 | 608 | 4 | 209 | 798 | 178 | 435 | 1,044 | 498 | 4,192 |
| 1987 | 0 | 0 | 323 | 358 | 77 | 246 | 1,110 | 196 | 493 | 1,205 | 160 | 4,168 |
| 1988 | 2 | 0 | 477 | 221 | 59 | 121 | 1,180 | 132 | 395 | 793 | 725 | 4,105 |
| 1989 | 4 | 0 | 351 | 208 | 11 | 77 | 841 | 149 | 296 | 648 | 350 | 2,935 |
| 1990 | 2 | 0 | 436 | 198 | 14 | 72 | 990 | 150 | 343 | 886 | 415 | 3,506 |
| 1991 | 0 | 0 | 244 | 74 | 9 | 92 | 1,034 | 189 | 481 | 499 | 184 | 2,806 |
| 1992 | 0 | 0 | 43 | 141 | 5 | 112 | 1,245 | 194 | 468 | 580 | 221 | 3,009 |
| 1993 | 0 | 0 | 39 | 222 | 5 | 125 | 1,381 | 86 | 362 | 763 | 178 | 3,161 |
| 1994 | 0 | 0 | 21 | 87 | 4 | 122 | 957 | 70 | 220 | 390 | 169 | 2,040 |
| 1995 | 0 | 0 | 42 | 89 | 9 | 193 | 797 | 166 | 303 | 363 | 102 | 2,064 |
| 1996 | 0 | 0 | 40 | 157 | 17 | 260 | 1,222 | 166 | 546 | 790 | 162 | 3,360 |
| 1997 | 0 | 0 | 91 | 178 | 12 | 262 | 705 | 152 | 513 | 506 | 185 | 2,604 |
| 1998 | 0 | 0 | 281 | 135 | 9 | 136 | 579 | 127 | 315 | 827 | 156 | 2,565 |
| 1999 | 0 | 0 | 574 | 176 | 15 | 209 | 501 | 168 | 486 | 740 | 106 | 2,975 |
| **50-99 Mean** | 0 | 0 | 139 | 239 | 26 | 400 | 1,834 | 71 | 286 | 2,355 | 337 | 5,586 |
| **50-99 %** | 0.0% | 0.0% | 2.5% | 4.3% | 0.5% | 7.2% | 32.8% | 1.3% | 5.1% | 42.1% | 6.0% | 100.0% |
| **90-99 Mean** | 0 | 0 | 181 | 146 | 10 | 158 | 941 | 147 | 404 | 634 | 188 | 2,809 |
| **90-99 %** | 0.0% | 0.0% | 6.4% | 5.2% | 0.4% | 5.6% | 33.5% | 5.2% | 14.4% | 22.6% | 6.7% | 100.0% |

*Landings north of Cape Hatteras, NC.

n/a=not available

**Table 4.  Black sea bass commercial landings by gear, Maine to Cape Hatteras, North Carolina, 1990 - 1999 combined.**

| Gear | 1,000 Pounds | Percent |
|------|-------------:|--------:|
| Unknown Combined Gear | 207 | 0.73 |
| Haul Seines, Beach | 1 | * |
| Haul Seines, Long | * | * |
| Gill Net, Drift, Large Pelagic | * | * |
| Pots and Traps, Eel | * | * |
| Pots and Traps, Offshore Wire | * | * |
| Otter Trawl Bottom, Crab | * | * |
| Otter Trawl Bottom, Fish | 11,353 | 40.32 |
| Otter Trawl Bottom, Scallop | 46 | 0.16 |
| Otter Trawl Bottom, Shrimp | * | * |
| Otter Trawl Bottom, Other | 18 | 0.06 |
| Otter Trawl Midwater | * | * |
| Trawl Midwater, Paired | 9 | 0.03 |
| Trawl Bottom, Paired | * | * |
| Scottish Seine | * | * |
| Pound Nets, Fish | 23 | 0.08 |
| Pound Nets, Other | 4 | 0.02 |
| Floating Traps (Shallow) | 144 | 0.51 |
| Pots And Traps, Combined | * | * |
| Pots And Traps, Conch | 24 | 0.09 |
| Pots And Traps, Crab, Blue | 21 | 0.08 |
| Pots And Traps, Fish | 12,878 | 45.74 |
| Pots And Traps, Lobster Inshore | 259 | 0.92 |
| Pots And Traps, Lobster Offshore | 256 | 0.91 |
| Pots And Traps, Other | 204 | 0.73 |
| Dredges, Crab | * | * |
| Gill Nets, Sea Bass | 8 | 0.03 |
| Gill Nets, Other | 6 | 0.02 |
| Gill Nets, Sink, Other | 105 | 0.37 |
| Gill Net, Shad | * | * |
| Gill Nets, Drift, Other | 26 | 0.09 |
| Gill Nets, Drift, Runaround | 3 | 0.01 |
| Gill Nets, Stake | * | * |
| Trammel Nets | * | * |
| Troll And Handline | * | * |
| Lines Hand, Other | 2,475 | 8.79 |
| Lines Troll, Other | 20 | 0.07 |
| Lines Long Set With Hooks | 27 | 0.1 |
| Dip Nets, Common | * | * |
| Dredge, Surfclam | * | * |
| Dredges Scallop, Sea | 37 | 0.13 |

Source: NMFS Weighout Data.

**Table 5. Black sea bass commercial landings, by state and gear type, 1990-1999 combined.**

| Gear | ME % of Total | MA % of Total | RI % of Total | CT % of Total | NY % of Total | NJ % of Total | DE % of Total | MD % of Total | VA % of Total | NC % of Total |
|---|---|---|---|---|---|---|---|---|---|---|
| Unknown Combined Gears | | 1.55 | * | 16.14 | 0.07 | 1.36 | | 0.8 | * | * |
| Haul Seines, Beach | | | | | 0 | | | | 0 | 0.05 |
| Haul Seines, Long | | | | | | | | | | 0 |
| Gill Net, Drift, Large Pelagic | | * | * | | | | | | | |
| Pots and Traps, Eel | | | 0 | | | | | | | |
| Pots and Traps, Offshore Wire | | | | | | | | * | | |
| Otter Trawl Bottom, Crab | | | | | | 0 | | | | |
| Otter Trawl Bottom, Fish | 95.02 | 3.58 | 79.04 | 70.32 | 64.82 | 41.11 | | 4.01 | 62.73 | 55.33 |
| Otter Trawl Bottom, Scallop | | 0 | | | | 0.09 | | 0.05 | 0.55 | * |
| Otter Trawl Bottom, Shrimp | | | | | | | | | | 0 |
| Otter Trawl Bottom, Other | | | | | | | | 0.39 | * | |
| Otter Trawl, Midwater | | | 0 | | | | | | | |
| Trawl Midwater, Paired | | 0.49 | | | | | | | | |
| Trawl Bottom, Paired | | | | | * | | | | | |
| Scottish Seine | | * | | | | | | | | |
| Pound Nets, Fish | | | * | 0.05 | 1.35 | 0 | | * | 0 | 0 |
| Pound Nets, Other | | 0.22 | | | * | | | | | |
| Floating Traps (Shallow) | | | 9.91 | | | | | | | |
| Pots And Traps, Combined. | | | * | | 0 | | | | | |
| Pots And Traps, Conch | | 0.11 | | | 0 | | | 0.29 | 0.16 | 0 |
| Pots And Traps, Crab, Blue | | | | | | * | | | 0.33 | 0 |
| Pots And Traps, Fish | | 71.3 | 4.83 | 3.16 | 5.76 | 53.49 | 96.5 | 91.53 | 16.6 | 7.79 |
| Pots And Traps, Lobster Inshore | | * | 1.95 | 1.37 | 12.02 | 0.4 | | | | |
| Pots And Traps, Lobster Offshore | | 0.11 | 0.56 | 0.69 | 2.38 | 1.92 | 0.88 | 0.31 | 0 | |
| Pots And Traps, Other | | 9.87 | 0.06 | | 0 | | | 0.41 | 0.13 | |
| Dredges, Crab | | | | | | 0 | | | | |
| Gill Nets, Sea Bass | | | | | | | | 0.2 | | |
| Gill Nets, Other | | | | | | | * | 0 | | 0.28 |
| Gill Nets, Sink, Other | 0.65 | 1.04 | 0.55 | * | 0.52 | 0.09 | | 1.27 | 0.16 | |
| Gill Net, Shad | | | | | | | | 0 | | |
| Gill Nets, Drift, Other | | | 0 | 0.21 | | 0.11 | * | 0.19 | 0.11 | 0 |
| Gill Nets, Drift, Runaround | | | | | | * | | | | |
| Gill Nets, Stake | | | | | | | 0 | | 0 | |
| Trammel Nets | | | | | | 0 | | | | |
| Troll and Handline | | | 0 | | | | | | | |
| Lines Hand, Other | | 11.15 | 2.74 | 7.62 | 12.62 | 1.28 | 2.58 | 0.53 | 18.65 | 35.39 |
| Lines Troll, Other | | | 0.23 | | | | | | | 0.9 |
| Lines Long Set With Hooks | 4.33 | 0.48 | * | | 0.43 | 0.05 | | 0 | 0.05 | 0.18 |
| Dip Nets, Common | | | | | | | | | | 0 |
| Dredges Scallop, Sea | | 0.05 | * | 0.42 | | 0.05 | | 0 | 0.49 | 0 |

Source: NMFS Weighout Data.

**Table 6. Black sea bass commercial landings by distance from shore, 1999.**

| | Black Sea Bass | | | |
|---|---|---|---|---|
| | 0-3 miles ('000 lbs) | 3-200 miles ('000 lbs) | Total ('000 lbs) | % EEZ |
| ME | NA | NA | | |
| NH | NA | NA | | |
| MA | 571 | 3 | 574 | 0.5 |
| RI | 65 | 111 | 176 | 63.1 |
| CT | 2 | 12 | 14 | 85.7 |
| NY | 82 | 127 | 209 | 60.8 |
| NJ | 8 | 493 | 501 | 98.4 |
| DE | NA | NA | | |
| MD | 78 | 407 | 485 | 83.9 |
| VA | 2 | 738 | 740 | 99.7 |
| NC | 26 | 564 | 590 | 95.6 |
| Total | 834 | 2455 | 3289 | 74.6 |

Source: NMFS General Canvass Data.

**Table 7.  Distribution (%) of black sea bass commercial landings by month and state, all gear, 1990-1999 combined.**

|        | Jan   | Feb   | Mar   | Apr   | May   | Jun   | Jul   | Aug   | Sep   | Oct   | Nov   | Dec   | Total  |
|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| ME     | 97.78 | 1.16  | 0.4   |       |       |       |       | 0.65  |       |       |       |       | 99.99  |
| NH     |       |       |       |       |       |       |       |       |       |       |       |       |        |
| MA     | 0.08  | 0.23  | 0.15  | 0.15  | 32.51 | 31.60 | 5.72  | 3.31  | 8.28  | 16.33 | 1.58  | 0.08  | 100.02 |
| RI     | 14.48 | 12.15 | 11.09 | 12.57 | 12.22 | 3.53  | 2.40  | 3.04  | 2.97  | 4.87  | 11.86 | 8.83  | 100.01 |
| CT     | 14.52 | 9.68  | 11.29 | 8.06  | 6.45  | 3.23  | 3.23  | 3.23  | 6.45  | 9.68  | 8.06  | 16.13 | 100.01 |
| NY     | 6.83  | 7.96  | 8.31  | 12.46 | 11.76 | 9.51  | 6.06  | 6.83  | 5.85  | 6.69  | 9.01  | 8.73  | 100.00 |
| NJ     | 10.63 | 12.22 | 10.01 | 7.02  | 10.02 | 6.83  | 4.79  | 4.49  | 5.81  | 9.99  | 11.04 | 7.15  | 100.00 |
| DE     | 0.37  |       |       | 0.87  | 15.67 | 6.97  | 4.60  | 2.24  | 4.73  | 7.96  | 13.81 | 42.79 | 100.01 |
| MD     | 0.82  | 1.21  | 1.14  | 3.87  | 24.18 | 18.36 | 12.81 | 9.94  | 8.30  | 8.25  | 6.47  | 4.66  | 100.01 |
| VA     | 14.39 | 16.82 | 22.83 | 12.93 | 7.57  | 3.62  | 3.07  | 2.04  | 2.61  | 5.67  | 4.85  | 3.60  | 100.00 |
| NC     | 17.11 | 18.02 | 19.46 | 15.72 | 4.00  | 1.55  | 3.89  | 6.93  | 3.09  | 1.17  | 3.41  | 5.65  | 100.00 |
| Total* | 9.67  | 10.85 | 11.55 | 8.62  | 12.65 | 8.64  | 5.51  | 4.82  | 5.18  | 7.89  | 7.89  | 6.74  | 100.01 |

\* = Total by state does not include landings with month unknown.

Source: NMFS Weighout Data.

**Table 8. Black sea bass commercial and recreational landings ('000 lbs), 1981-1999.**

| Year | Comm | Rec | Total | % Comm | % Rec |
|------|------|------|--------|--------|-------|
| 1981 | 2,489 | 1,232 | 3,721 | 67% | 33% |
| 1982 | 2,595 | 9,894 | 12,489 | 21% | 79% |
| 1983 | 3,336 | 4,079 | 7,415 | 45% | 55% |
| 1984 | 4,332 | 1,447 | 5,779 | 75% | 25% |
| 1985 | 3,419 | 2,097 | 5,516 | 62% | 38% |
| 1986 | 4,191 | 12,392 | 16,583 | 25% | 75% |
| 1987 | 4,167 | 1,924 | 6,091 | 68% | 32% |
| 1988 | 4,142 | 2,869 | 7,011 | 59% | 41% |
| 1989 | 2,919 | 3,289 | 6,208 | 47% | 53% |
| 1990 | 3,501 | 2,761 | 6,262 | 56% | 44% |
| 1991 | 2,804 | 4,186 | 6,990 | 40% | 60% |
| 1992 | 3,007 | 2,706 | 5,713 | 53% | 47% |
| 1993 | 3,225 | 4,842 | 8,067 | 40% | 60% |
| 1994 | 2,039 | 2,948 | 4,987 | 41% | 59% |
| 1995 | 2,062 | 6,207 | 8,269 | 25% | 75% |
| 1996 | 3,360 | 3,993 | 7,353 | 46% | 54% |
| 1997 | 2,614 | 4,268 | 6,882 | 38% | 62% |
| 1998 | 2,563 | 1,152 | 3,715 | 69% | 31% |
| 1999 | 2,974 | 1,697 | 4,671 | 64% | 36% |
| | | | | | |
| Total | | | | | |
| Mean 90-99 | 3,144 | 3,894 | 7,038 | 45% | 55% |
| Mean | 2,815 | 3,476 | 6,291 | 45% | 55% |

Source: NMFS Weighout Data and MRFSS Data.

**Table 9. Number of black sea bass recreational fishing trips, recreational harvest limit, and recreational landings from 1990 to 1999.**

| Year | Number of Fishing Trips[a] | Recreational Harvest Limit (million lb) | Recreational Landings of BSB (million lb)[b] |
|------|------|------|------|
| 1990 | 863,707 | None | 4.14 |
| 1991 | N/A | None | 4.19 |
| 1992 | 218,700 | None | 2.71 |
| 1993 | 296,370 | None | 4.84 |
| 1994 | 265,402 | None | 2.95 |
| 1995 | 315,165 | None | 6.21 |
| 1996 | 282,972 | None | 4.00 |
| 1997 | 313,052 | None | 4.27 |
| 1998 | N/A | 3.15 | 1.15 |
| 1999 | N/A | 3.15 | 1.70 |

[a] Number of fishing trips as reported by anglers in the intercept survey indicating that the primary species group sought was summer flounder, North Atlantic, Mid-Atlantic, and South Atlantic regions combined. Estimates are not expanded. Source: MRFSS, Data.
[b] From Maine to North Carolina.

N/A = Data not available.

**Table 10.  Recreational black sea bass landings (number) by state, 1990-1999.**

| Year | ME | NH | MA | RI | CT | NY | NJ | DE | MD | VA | NC | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1990 | - | - | 31,236 | 7,865 | 825 | 356,918 | 1,505,745 | 112,567 | 494,356 | 1,343,904 | 415,334 | 4,268,750 |
| 1991 |  | 274 | 24,976 | 9,521 | 1,528 | 197,611 | 2,486,662 | 392,325 | 640,916 | 1,446,653 | 257,634 | 5,458,100 |
| 1992 |  |  | 5,918 | 12,211 | 7,990 | 163,554 | 1,579,431 | 195,915 | 758,596 | 783,130 | 362,038 | 3,868,783 |
| 1993 |  |  | 11,379 | 25,663 | 10,020 | 218,764 | 4,212,362 | 237,081 | 593,581 | 672,354 | 215,366 | 6,196,570 |
| 1994 |  |  | 6,676 | 16,769 | - | 218,184 | 1,913,993 | 66,712 | 273,541 | 912,975 | 162,011 | 3,570,861 |
| 1995 |  | - | 8,493 | 41,723 | 5,196 | 90,026 | 3,953,412 | 209,549 | 1,498,449 | 919,636 | 160,298 | 6,886,782 |
| 1996 |  | - | 16,757 | 43,232 | 5,404 | 78,897 | 2,320,501 | 58,878 | 286,687 | 799,323 | 154,603 | 3,764,282 |
| 1997 |  | - | 15,960 | 35,125 | 1,724 | 216,891 | 3,352,953 | 91,082 | 372,178 | 635,559 | 146,041 | 4,867,513 |
| 1998 |  |  | 7,332 | 25,637 | 3,491 | 12,391 | 272,808 | 52,089 | 354,203 | 398,010 | 133,059 | 1,259,020 |
| 1999 | - | - | 20,985 | 25,290 | 1,583 | 88,880 | 449,134 | 41,462 | 159,527 | 536,489 | 88,493 | 1,411,843 |
| **Total** | - | 274 | 149,712 | 243,036 | 37,761 | 1,642,116 | 22,047,001 | 1,457,660 | 5,432,034 | 8,448,033 | 2,094,877 | 41,552,504 |
| **% of Total** | - | 0.0 | 0.4 | 0.6 | 0.1 | 4.0 | 53.1 | 3.5 | 13.1 | 20.3 | 5.0 | 100.0 |

Source: MRFSS Data.

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**Table 11. Black sea bass recreational landings (a+b1), in number, by distance from shore, Maine through North Carolina.**

| YEAR | NORTH ATLANTIC | | | MID-ATLANTIC | | | NORTH CAROLINA | | |
|---|---|---|---|---|---|---|---|---|---|
| | (<= 3 MI) | OCEAN (> 3 MI) | INLAND | (<= 3 MI) | OCEAN (> 3 MI) | INLAND | (<= 3 MI) | OCEAN (> 3 MI) | INLAND |
| 1990 | 11,089 | 13,575 | 15,262 | 517,695 | 2,551,156 | 744,638 | 99,595 | 282,328 | 33,410 |
| 1991 | 10,514 | 1,840 | 23,945 | 901,566 | 3,145,033 | 1,117,568 | 97,309 | 139,602 | 20,723 |
| 1992 | 9,823 | 5,411 | 10,885 | 747,721 | 2,232,389 | 500,515 | 100,545 | 237,615 | 23,878 |
| 1993 | 15,354 | 7,623 | 24,084 | 2,229,831 | 3,040,787 | 663,525 | 70,551 | 123,438 | 21,377 |
| 1994 | 16,020 | 2,692 | 4,733 | 213,935 | 2,581,279 | 590,192 | 29,916 | 109,749 | 22,345 |
| 1995 | 35,376 | 11,425 | 8,611 | 274,115 | 5,408,822 | 988,136 | 36,370 | 109,318 | 14,610 |
| 1996 | 28,480 | 19,308 | 17,606 | 327,398 | 2,725,230 | 491,659 | 14,991 | 118,302 | 21,310 |
| 1997 | 10,919 | 25,578 | 16,311 | 320,046 | 4,065,634 | 282,981 | 25,296 | 91,287 | 29,457 |
| 1998 | 19,983 | 4,298 | 12,178 | 66,687 | 970,893 | 51,920 | 33,990 | 80,801 | 18,268 |
| 1999 | 24,055 | 6,409 | 17,395 | 188,658 | 975,512 | 111,322 | 35,433 | 43,609 | 9,451 |
| 90-99 MEAN | 18,161 | 9,816 | 15,101 | 578,765 | 2,769,674 | 554,246 | 54,400 | 133,605 | 21,483 |
| MEAN % | 42.16 | 22.79 | 35.05 | 14.83 | 70.97 | 14.20 | 25.97 | 63.78 | 10.25 |

Source: MRFSS Data.

Table 12. Black sea bass recreational landings (a+b1, in number), by fishing mode, Maine through North Carolina.

| | NORTH ATLANTIC | | | MID-ATLANTIC | | | NORTH CAROLINA | | |
|---|---|---|---|---|---|---|---|---|---|
| YEAR | SHORE | PARTY/ CHARTER | PRIVATE/ RENTAL | SHORE | PARTY/ CHARTER | PRIVATE/ RENTAL | SHORE | PARTY/ CHARTER | PRIVATE/ RENTAL |
| 1990 | 3,957 | 18,709 | 17,259 | 247,229 | 2,161,489 | 1,404,772 | 38,194 | 88,715 | 288,425 |
| 1991 | 2,536 | 1,722 | 32,041 | 242,387 | 2,532,676 | 2,389,105 | 5,755 | 51,750 | 200,129 |
| 1992 | 0 | 4,917 | 21,201 | 43,108 | 1,955,178 | 1,482,339 | 2,260 | 83,093 | 276,685 |
| 1993 | 0 | 7,584 | 39,478 | 48,197 | 4,529,975 | 1,355,970 | 6,479 | 42,105 | 166,781 |
| 1994 | 11,513 | 988 | 10,943 | 227,464 | 1,950,911 | 1,207,030 | 4,369 | 53,989 | 103,653 |
| 1995 | 2,945 | 27,467 | 25,000 | 262,710 | 5,103,314 | 1,305,049 | 10,325 | 66,448 | 83,525 |
| 1996 | 1,176 | 31,738 | 32,480 | 66,113 | 2,524,677 | 953,496 | 3,233 | 75,319 | 76,050 |
| 1997 | | 28,745 | 24,064 | 7,847 | 3,893,581 | 767,234 | 490 | 28,009 | 117,542 |
| 1998 | 0 | 3,459 | 33,001 | 5,894 | 739,958 | 343,648 | 1,179 | 34,457 | 97,423 |
| 1999 | 363 | 10,215 | 37,280 | 17,390 | 576,558 | 681,543 | 1,477 | 34,580 | 52,435 |
| 90-99 Mean | 2,499 | 13,554 | 27,275 | 116,834 | 2,596,832 | 1,189,019 | 7,376 | 55,847 | 146,264 |
| % Mean | 5.8 | 31.3 | 62.9 | 3.0 | 66.5 | 30.5 | 3.5 | 26.7 | 69.8 |

Source: MRFSS Data.

Table 13. The percentage (%) contribution of black sea bass to the total catch by party charter vessels, 1996-1999 combined.

| STATE | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CT | 0.00 | | | 0.00 | 0.05 | 0.01 | 0.02 | 0.03 | 0.16 | 0.13 | 0.39 | 0.00 | 0.08 |
| DE | | | | 0.00 | 64.87 | 32.61 | 4.40 | 4.89 | 24.59 | 42.57 | 0.00 | 0.00 | 10.73 |
| ME | | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.38 | 0.00 | 0.00 | 0.03 |
| MD | | 0.00 | 0.00 | 7.44 | 91.16 | 87.38 | 15.26 | 2.30 | 19.68 | 80.09 | 96.59 | 88.53 | 38.08 |
| MA | 0.00 | | 0.00 | 0.00 | 1.76 | 1.28 | 2.44 | 1.36 | 2.02 | 1.25 | 0.00 | 0.00 | 1.39 |
| NH | | | | | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 |
| NJ | 11.13 | 10.71 | 5.03 | 1.45 | 30.59 | 28.03 | 15.39 | 16.73 | 38.83 | 57.97 | 51.94 | 14.64 | 28.74 |
| NY | 0.00 | 0.03 | 0.01 | 0.25 | 4.54 | 14.41 | 11.14 | 18.63 | 25.57 | 26.53 | 35.78 | 5.91 | 17.42 |
| NC | 0.00 | 1.84 | 0.00 | 22.93 | 43.97 | 27.36 | 39.30 | 35.17 | 34.97 | 24.93 | 14.55 | 0.00 | 32.65 |
| RI | 2.62 | 0.00 | 0.00 | 0.01 | 0.06 | 0.48 | 1.08 | 0.10 | 1.51 | 3.22 | 11.63 | 12.27 | 0.77 |
| VA | 0.00 | 0.00 | 0.54 | 43.14 | 67.56 | 17.89 | 16.31 | 10.52 | 85.13 | 91.19 | 92.87 | 89.38 | 47.37 |
| Total | 7.29 | 6.94 | 2.69 | 1.43 | 18.93 | 19.45 | 11.04 | 9.56 | 28.39 | 45.01 | 49.09 | 13.08 | 20.00 |

Source: Vessel Trip Report Data.

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**Table 14. Ex-vessel value, nominal price and 2000 adjusted price of black sea bass by year, 1991-2000, ME to Cape Hatteras (NC), all gear combined.**

| Year | Nominal Value 1,000 $ | Nominal Price Mean | Mean Price in constant 2000 $ |
|------|------|------|------|
| 1991 | 3,516 | 1.25 | 1.43 |
| 1992 | 3,158 | 1.05 | 1.19 |
| 1993 | 3,240 | 1.03 | 1.14 |
| 1994 | 2,386 | 1.17 | 1.29 |
| 1995 | 3,042 | 1.48 | 1.57 |
| 1996 | 3,896 | 1.16 | 1.20 |
| 1997 | 3,909 | 1.50 | 1.56 |
| 1998 | 4,341 | 1.69 | 1.81 |
| 1999 | 5,037 | 1.69 | 1.79 |
| 2000 | 4,758 | 1.79 | 1.79 |

**Table 15. Total ex-vessel value of all finfish and shellfish landings, ex-vessel value of black sea bass, and black sea bass as a percentage of the total ex-vessel value by state, 1999 and 2000.**

| | | 1999 | | | 2000 | |
| | Total Ex-vessel Value ($1,000) | Black Sea Bass Ex-vessel Value ($1,000) | Black Sea Bass Percent | Total Ex-vessel Value ($1,000) | Black Sea Bass Ex-vessel Value ($1,000) | Black Sea Bass Percent |
|------|------|------|------|------|------|------|
| State | | | | | | |
| ME | 323,809 | 0 | 0.00 | 354,055 | <1 | 0.00 |
| NH | 12,542 | 0 | 0.00 | 13,951 | 0 | 0.00 |
| MA | 260,239 | 961 | 0.37 | 288,262 | 969 | 0.34 |
| RI | 79,270 | 331 | 0.42 | 72,544 | 190 | 0.26 |
| CT | 38,090 | 28 | 0.07 | 31,227 | 26 | 0.08 |
| NY | 76,046 | 453 | 0.60 | 59,425 | 256 | 0.43 |
| NJ | 97,555 | 781 | 0.80 | 107,163 | 1033 | 0.96 |
| DE | 6,893 | 275 | 4.00 | 6,707 | 89 | 1.33 |
| MD | 63,759 | 760 | 1.19 | 53,874 | 475 | 0.88 |
| VA | 108,253 | 1,195 | 1.10 | 118,336 | 1335 | 1.13 |
| NC | 30,689 | 456 | 1.49 | 36,739 | 385 | 1.05 |
| | | | | | | |
| Total | 1,097,146 | 5,240 | 0.48 | 1,142,283 | 4,758 | 0.42 |

**Table 16. Landings, value, and price of black sea bass by state for 2000, all gear combined.**

| State | Landings (1,000 lbs) | Value ($1,000) | Price ($/lb) |
|---|---|---|---|
| ME | <1 | <1 | 1.44 |
| MA | 626 | 969 | 1.55 |
| RI | 101 | 190 | 1.87 |
| CT | 15 | 26 | 1.80 |
| NY | 135 | 256 | 1.90 |
| NJ | 587 | 1,033 | 1.76 |
| DE | 55 | 89 | 1.61 |
| MD | 305 | 475 | 1.56 |
| VA | 648 | 1,335 | 2.06 |
| NC | 185 | 385 | 2.08 |
| | | | |
| Total | 2,658 | 4,758 | 1.79 |

**Table 17. Landings, value, and price of black sea bass by month, 1991-2000 averaged, ME to Cape Hatteras (NC), all gear combined.**

| Month | Landings (1,000 lbs) | Value ($1,000) | Adjusted Price ($/lb) |
|---|---|---|---|
| Jan | 1,963 | 2,987 | 1.52 |
| Feb | 2,868 | 3,614 | 1.26 |
| Mar | 3,101 | 4,107 | 1.32 |
| Apr | 2,301 | 3,252 | 1.41 |
| May | 3,609 | 5,013 | 1.39 |
| Jun | 2,311 | 3,238 | 1.40 |
| Jul | 1,658 | 2,722 | 1.64 |
| Aug | 1,189 | 2,012 | 1.69 |
| Sep | 1,263 | 2,112 | 1.67 |
| Oct | 2,464 | 3,702 | 1.50 |
| Nov | 1,881 | 2,857 | 1.52 |
| Dec | 1,692 | 2,731 | 1.61 |
| | | | |
| All | 26,300 | 38,346 | 1.46 |

**Table 18. Average ex-vessel commercial landings of black sea bass, value and price by month and water area, ME to NC, 1999-2000 combined.**

| | State (<3 miles) | | | EEZ (>3 miles) | | |
|---|---|---|---|---|---|---|
| Month | Landings (1,000 lbs) | Value ($1,000) | Average Price | Landings (1,000 lbs) | Value ($1,000) | Average Price |
| Jan | <1 | 2 | 3.58 | <1 | 2 | 1.75 |
| Feb | <1 | 1 | 2.67 | 5 | 7 | 1.51 |
| Mar | 1 | 2 | 1.76 | 3 | 5 | 1.43 |
| Apr | 1 | 2 | 1.32 | 5 | 10 | 2.20 |
| May | 185 | 290 | 1.57 | <1 | 1 | 1.76 |
| Jun | 117 | 158 | 1.35 | 3 | 4 | 1.45 |
| Jul | 67 | 141 | 2.10 | 5 | 10 | 1.96 |
| Aug | 4 | 8 | 2.14 | 12 | 32 | 2.60 |
| Sep | 2 | 3 | 1.28 | 7 | 21 | 3.07 |
| Oct | 181 | 260 | 1.44 | <1 | 1 | 1.81 |
| Nov | 7 | 15 | 2.20 | 0 | 0 | 0.00 |
| Dec | 6 | 9 | 1.59 | 0 | 0 | 0.00 |
| All | 571 | 890 | 1.56 | 41 | 92 | 2.22 |

**Table 19. Landings, ex-vessel value , and price of black sea bass by size category for 2000, ME to Cape Hatteras (NC), all gear combined.**

| Size Category | Landings (1,000 lbs) | Value ($1,000) | Price ($/lb) |
|---|---|---|---|
| Extra Small | <1 | <1 | 1.03 |
| Small | 513 | 536 | 1.05 |
| Medium | 643 | 948 | 1.47 |
| Large | 833 | 1,700 | 2.04 |
| Jumbo | 502 | 1,315 | 2.62 |
| Unclassified | 166 | 259 | 1.56 |

**Table 20. Summary of number of vessels holding federal commercial and/or recreational permit combinations for summer flounder, scup, and black sea bass.**

| Comm. Permit Combinations | Recreational Permit Combinations | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | No. Rec. Permit | FLK Only | SCP Only | FLK/ Scup | BSB Only | FLK/ BSB | SCP/ BSB | FLK/ SCP/ BSB | Row Total |
| No. Comm. Permit | 0 | 54 | 12 | 34 | 9 | 66 | 15 | 356 | 546 |
| FLK Only | 286 | 5 | 4 | 1 | 2 | 0 | 1 | 5 | 304 |
| SCP Only | 69 | 3 | 0 | 1 | 0 | 3 | 0 | 7 | 83 |
| BSB | 96 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 99 |
| FLK/ SCP | 178 | 3 | 0 | 6 | 3 | 5 | 2 | 8 | 205 |
| FLK/ BSB | 40 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 43 |
| SCP/ BSB | 172 | 8 | 0 | 1 | 0 | 1 | 2 | 24 | 208 |
| FLK/ SCP/ BSB | 462 | 3 | 1 | 1 | 0 | 0 | 0 | 14 | 481 |
| Column Total | 1303 | 77 | 17 | 44 | 14 | 77 | 22 | 415 | 1969 |

**Table 21. Other permit year 2000 federal northeast region permits held by summer flounder, scup, and black sea bass commercial and recreational vessels.**

| Northeast Permits | Commercial Only (n= 1,303) | | Party/Charter Only (n= 546) | | Commercial and Party/Charter (n= 120) | |
|---|---|---|---|---|---|---|
| | Vessels (No.) | Percent of Total | Vessels (No.) | Percent of Total | Vessels (No.) | Percent of Total |
| Surfclam | 620 | 47.6 | 84 | 15.4 | 24 | 20 |
| Ocean Quahog | 574 | 44.1 | 80 | 14.7 | 19 | 15.8 |
| Scallop | 253 | 19.4 | 0 | 0 | 4 | 3.3 |
| Non-trap Lobster | 594 | 45.6 | 8 | 1.5 | 10 | 8.3 |
| Lobster Trap | 355 | 27.2 | 43 | 7.9 | 24 | 20 |
| Party/ Charter Lobster | 2 | 0.2 | 14 | 2.6 | 2 | 1.7 |
| Party/ Charter Multi-Species | 433 | 33.2 | 440 | 80.6 | 52 | 43.3 |
| Comm. Multi-species | 711 | 54.6 | 63 | 11.5 | 52 | 43.3 |
| Party/ Charter Squid/ Mackerel/ Butterfish | 4 | 0.3 | 423 | 77.5 | 76 | 63.3 |
| Comm. Squid/ Mackerel/ Butterfish | 1071 | 82.2 | 220 | 39.6 | 86 | 71.7 |
| Comm. Bluefish | 1062 | 81.5 | 425 | 77.8 | 100 | 83.3 |
| Party/ Charter Bluefish | 14 | 1.1 | 84 | 15.4 | 88 | 73.3 |

**Table 22. Top ports of landing (in pounds), based on NMFS 1999 weighout data. Since this table includes only the "top ports," it may not include all of the landings for the year.**

| PORT | POUNDS FLK | # FLK Vessels | Pounds SCP | # SCP Vessels | Pounds BSB | # BSB Vessels |
|------|-----------|---------------|------------|---------------|------------|---------------|
| STONINGTON, CT | 188,498 | | 52,799 | | 8,207 | |
| OCEAN CITY, MD | 166,866 | 21 | C | C | 407,245 | 27 |
| CHATHAM, MA | 24,883 | 17 | 78,894 | 28 | 166,154 | 33 |
| NEW BEDFORD, MA | 318,553 | 139 | 264,495 | 31 | 85,143 | 42 |
| BARNSTABLE, MA | 126,224 | 31 | 47,083 | 25 | 10,758 | 27 |
| OTHER DUKES, MA | 157,619 | 30 | 34,376 | 23 | 118,436 | 29 |
| NANTUCKET, MA | 117,688 | 30 | 0 | 0 | C | C |
| OTHER MASS | 4,349 | 4 | 162,007 | 5 | 133,270 | 7 |
| BAYBORO, NC | 106,628 | 4 | 0 | 0 | C | C |
| BEAUFORT, NC | 576,122 | 25 | 0 | 0 | 21,317 | 13 |
| ENGELHARD, NC | 361,185 | 17 | 0 | 0 | 16,722 | 13 |
| ORIENTAL, NC | 312,304 | 19 | 0 | 0 | 783 | 6 |
| WANCHESE, NC | 1,020,351 | 53 | 0 | 0 | 85,612 | 56 |
| VANDEMERE, NC | 137,494 | 7 | 0 | 0 | C | C |
| BELFORD, NJ | 358,957 | 19 | 1,602 | 15 | 2,972 | 28 |
| WILDWOOD, NJ | 68,481 | 6 | C | C | 60,352 | 7 |
| CAPE MAY, NJ | 740,914 | 72 | 644,603 | 27 | 277,209 | 55 |
| PT. PLEASANT, NJ | 649,293 | 39 | 118,352 | 24 | 30,643 | 43 |
| SEA ISLE CITY, NJ | 6,891 | 5 | C | C | 107,018 | 7 |
| FREEPORT, NY | 30,012 | 24 | 63,675 | 9 | 18,825 | 17 |
| GREENPORT, NY | 70,182 | 22 | 54,358 | 14 | 13,247 | 14 |
| HAMPTON BAY, NY | 328,952 | 57 | 159,843 | 45 | 64,538 | 48 |
| MONTAUK, NY | 316,141 | 74 | 133,484 | 68 | 102,809 | 103 |
| LITTLE COMPTON, RI | 70,815 | 14 | 214,078 | 11 | 11,210 | 14 |
| NEWPORT, RI | 198,165 | 46 | 317,833 | 29 | 16,353 | 36 |
| POINT JUDITH, RI | 1,147,339 | 130 | 671,995 | 105 | 137,857 | 143 |
| TIVERTON, RI | 143,506 | 31 | 36,966 | 18 | 5,026 | 23 |
| CHINCOTEAGUE, VA | 391,248 | 29 | 323 | 5 | 84,125 | 24 |
| HAMPTON, VA | 719,640 | 39 | C | C | 219,437 | 33 |
| NEWPORT NEWS, VA | 887,148 | 59 | C | C | 72,343 | 42 |
| VIRGINIA BEACH, VA | C | C | C | C | 362,665 | 23 |

C = Confidential

Table 23. Ports with 10% or more revenue dependence on summer flounder, scup, and/or black sea bass, 1999.

| Port | State | County | All Species Value ($) | Percent (%) Summer Flounder | Percent (%) Scup | Percent (%) Black Sea Bass | Percent (%) Summer Flounder, Scup, Black Sea Bass Mix |
|---|---|---|---|---|---|---|---|
| Falmouth | MA | Barnstable | 118,464 | 47.69% | 0.59% | 0.23% | 48.51% |
| Other Dukes | MA | Dukes | 2,196,255 | 13.36% | 2.02% | 9.99% | 25.37% |
| Nantucket | MA | Nantucket | 510,147 | 46.22% | - | Confidential | Confidential |
| Other MA | MA | Not-Specified | 2,578,272 | 0.35% | 7.60% | 7.37% | 15.32% |
| Little Compton | RI | Newport | 1,853,977 | 6.35% | 18.16% | 1.36% | 25.88% |
| Newport | RI | Newport | 8,740,253 | 4.97% | 4.77% | 0.37% | 10.12% |
| Tiverton | RI | Newport | 3,807,282 | 7.94% | 1.74% | 0.23% | 9.90% |
| New Shoreham | RI | Washington | 113,282 | 39.8% | - | - | 39.82% |
| S. Kingstown | RI | Washington | 207,760 | Confidential | Confidential | Confidential | Confidential |
| Westerley | RI | Washington | 161,815 | Confidential | Confidential | Confidential | Confidential |
| Clinton | CT | Middlesex | 164,988 | Confidential | 15.78% | 0.22% | 33.00% |
| East Lyme | CT | New London | 199,495 | 7.83% | 16.32% | 0.17% | 24.32% |
| Freeport | NY | Nassau | 1,492,839 | 4.24% | 7.12% | 2.48% | 13.84% |
| Ammagansett | NY | Suffolk | 181,625 | Confidential | Confidential | Confidential | Confidential |
| Hampton Bay | NY | Suffolk | 8,471,407 | 8.33% | 2.85% | 1.37% | 12.54% |
| Mattituck | NY | Suffolk | 233,472 | 32.78% | 11.98% | 1.21% | 45.97% |
| Montauk | NY | Suffolk | 11,499,567 | 6.64% | 1.76% | 2.14% | 10.54% |
| Cape May | NJ | Cape May | 22,398,888 | 4.30% | 3.17% | 1.90% | 9.34% |
| Sea Isle City | NJ | Cape May | 1,646,613 | 0.73% | Confidential | 10.38% | Confidential |

Table 23 (continued). Ports with 10% or more revenue dependence on summer flounder, scup, and/or black sea bass, 1999.

| Port | State | County | All Species Value ($) | Percent (%) Summer Flounder | Percent (%) Scup | Percent (%) Black Sea Bass | Percent (%) Summer Flounder, Scup, Black Sea Bass Mix |
|---|---|---|---|---|---|---|---|
| Other Essex | NJ | Essex | 906,139 | 10.47% | - | 0.20% | 10.66% |
| Belford | NJ | Monmouth | 2,993,513 | 23.74% | 0.08% | 0.16% | 23.98% |
| Indian River | DE | Sussex | 574,019 | Confidential | Confidential | Confidential | Confidential |
| Lewes | DE | Sussex | 119,757 | - | - | Confidential | Confidential |
| Ocean City | MD | Worcester | 6,192,175 | 5.41% | 0.01% | 9.76% | 15.18% |
| Chincoteague | VA | Accomac | 2,138,891 | 30.00% | 0.01% | 6.21% | 36.21% |
| Hampton | VA | City of Hampton | 8,670,343 | 10.87% | 0.01% | 3.69% | 14.57% |
| VA Beach/Lynn Haven | VA | City of VA Beach | 4,347,932 | 0.36% | Confidential | 14.60% | Confidential |
| Atlantic | NC | Carteret | 1,003,298 | 12.14% | - | 0.06% | 12.20% |
| Beaufort | NC | Carteret | 3,653,821 | 18.95% | - | 1.00% | 19.96% |
| Other Carteret | NC | Carteret | 224,897 | Confidential | - | Confidential | Confidential |
| Wanchese | NC | Dare | 9,748,684 | 13.26% | - | 2.00% | 15.27% |
| Engelhard | NC | Hyde | 4,244,478 | 10.87% | - | 0.71% | 11.58% |
| Bayboro | NC | Pamlico | 507,960 | 24.85% | - | Confidential | Confidential |
| Lowland | NC | Pamlico | 522,277 | 19.16% | - | - | 19.16% |
| Oriental | NC | Pamlico | 3,518,360 | 11.82% | - | 0.04% | 11.85% |
| Vandemere | NC | Pamlico | 1,516,704 | 10.02% | - | 0.01% | 10.03% |

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**Table 24.** Black sea bass commercial landings by gear, Maine to Cape Hatteras, North Carolina, 1990 - 1999 combined.

| Gear | 1,000 Pounds | Percent |
|------|------|------|
| Unknown Combined Gear | 207 | 0.73 |
| Haul Seines, Beach | 1 | * |
| Haul Seines, Long | * | * |
| Gill Net, Drift, Large Pelagic | * | * |
| Pots and Traps, Eel | * | * |
| Pots and Traps, Offshore Wire | * | * |
| Otter Trawl Bottom, Crab | * | * |
| Otter Trawl Bottom, Fish | 11,353 | 40.32 |
| Otter Trawl Bottom, Scallop | 46 | 0.16 |
| Otter Trawl Bottom, Shrimp | * | * |
| Otter Trawl Bottom, Other | 18 | 0.06 |
| Otter Trawl Midwater | * | * |
| Trawl Midwater, Paired | 9 | 0.03 |
| Trawl Bottom, Paired | * | * |
| Scottish Seine | * | * |
| Pound Nets, Fish | 23 | 0.08 |
| Pound Nets, Other | 4 | 0.02 |
| Floating Traps (Shallow) | 144 | 0.51 |
| Pots And Traps, Combined | * | * |
| Pots And Traps, Conch | 24 | 0.09 |
| Pots And Traps, Crab, Blue | 21 | 0.08 |
| Pots And Traps, Fish | 12,878 | 45.74 |
| Pots And Traps, Lobster Inshore | 259 | 0.92 |
| Pots And Traps, Lobster Offshore | 256 | 0.91 |
| Pots And Traps, Other | 204 | 0.73 |
| Dredges, Crab | * | * |
| Gill Nets, Sea Bass | 8 | 0.03 |
| Gill Nets, Other | 6 | 0.02 |
| Gill Nets, Sink, Other | 105 | 0.37 |
| Gill Net, Shad | * | * |
| Gill Nets, Drift, Other | 26 | 0.09 |
| Gill Nets, Drift, Runaround | 3 | 0.01 |
| Gill Nets, Stake | * | * |
| Trammel Nets | * | * |
| Troll And Handline | * | * |
| Lines Hand, Other | 2,475 | 8.79 |
| Lines Troll, Other | 20 | 0.07 |
| Lines Long Set With Hooks | 27 | 0.1 |
| Dip Nets, Common | * | * |
| Dredge, Surfclam | * | * |
| Dredges Scallop, Sea | 37 | 0.13 |

Source: NMFS Weighout Data.

Table 25. Trip expenses (per trip) for small trawlers in the Northeast, whose primary gear was otter trawl, 1996.

| | **Breakdown of Trip Expenses per Trip** | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | Fuel per Trip [a] ($/trip) | Oil per Trip [a] ($/trip) | Ice per Trip [a] ($/trip) | Food, Water per Trip [a] ($/trip) | Lumpers Fees per Trip [a] ($/trip) | Supplies per Trip [a] ($/trip) | Consignment Fees per Trip [a] ($/trip) | Other Trip Expenses [a] ($/trip) | Total Operating Costs per Trip in 1996 [a] ($/trip) |
| Maximum | 454 | 40 | 136 | 75 | 60 | 200 | 250 | 150 | 722 |
| Minimum | 30 | 2 | 2 | 3 | 10 | 2 | 3 | 5 | 30 |
| Range | 424 | 38 | 134 | 72 | 50 | 198 | 247 | 145 | 692 |
| Mode | 100 | 10 | 10 | 10 | 20 | 10 | -[b] | 10 | 250 |
| Median | 100 | 10 | 20 | 20 | 30 | 29 | 40 | 15 | 210 |
| Mean | 132 | 14 | 39 | 27 | 33 | 52 | 76 | 38 | 267 |
| Standard Error of the Mean | 16.35 | 1.82 | 7.68 | 3.97 | 6.09 | 10.33 | 26.40 | 18.12 | 30.03 |
| Standard Dev. | 93.90 | 10.12 | 39.17 | 21.36 | 18.27 | 55.64 | 79.21 | 51.24 | 177.64 |
| Skewness | 1.99 | 1.16 | 1.15 | 1.00 | 0.25 | 1.55 | 1.57 | 1.93 | 1.19 |
| | | | | | | | | | |
| Count | 33 | 31 | 26 | 29 | 9 | 29 | 9 | 8 | 35 |
| # of Trimmed Responses [a] | 2 | 4 | 2 | 4 | 1 | 2 | 1 | 1 | - |

[a] Cost Data were trimmed to exclude unusual values (i.e. values greater or lower than the Mean o 1 standard deviation respectively).

[b] In cases where all values reported were distinct, there is no modal value: we then report this as blank ("-"). The proper interpretation of such a ("-") cell is that all values within the range are equally likely.

Source: Lallemand et al. 1998.

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Table 26. Trip expenses (per day) for small trawlers in the Northeast, whose primary gear was otter trawl, 1996.

## Breakdown of Trip Expenses per Day

| | Fuel per day [a] ($/ day) | Oil per day [a] ($/ day) | Ice per day [a] ($/ day) | Food, Water per day [a] ($/ day) | Lumpers Fees per day [a] ($/ day) | Supplies Per day [a] ($/ day) | Consignment Fees per day [a] ($/ day) | Other Trip Expenses per day [a] ($/ day) | Total Operating Costs per day in 1996 [a] ($/ day) |
|---|---|---|---|---|---|---|---|---|---|
| Maximum | 160 | 25 | 60 | 56 | 40 | 100 | 82 | 80 | 304 |
| Minimum | 50 | 3 | 3 | 3 | 10 | 2 | 16 | 5 | 101 |
| Range | 110 | 22 | 57 | 53 | 30 | 98 | 65 | 75 | 203 |
| Mode | 100 | 10 | 10 | 10 | 20 | 10 | -[b] | -[b] | 255 |
| Median | 100 | 10 | 20 | 20 | 20 | 23 | 45 | 15 | 190 |
| Mean | 97 | 11 | 26 | 23 | 23 | 33 | 48 | 26 | 191 |
| Standard Error of the Mean | 4.77 | 1.10 | 3.79 | 2.79 | 3.82 | 5.68 | 7.71 | 9.35 | 10.56 |
| Standard Dev. | 25.69 | 5.93 | 18.56 | 15.27 | 10.11 | 28.95 | 21.81 | 26.44 | 58.78 |
| Skewness | 0.39 | 1.10 | 0.50 | 0.65 | 0.75 | 1.07 | 0.25 | 1.63 | 0.19 |
| | | | | | | | | | |
| Count | 29 | 29 | 24 | 30 | 7 | 26 | 8 | 8 | 31 |
| # of Trimmed Responses [a] | 6 | 6 | 4 | 3 | 3 | 5 | 2 | 1 | 4 |

[a] Cost Data were trimmed to exclude unusual values (i.e. values greater or lower than the Mean o 1 standard deviation respectively).

[b] In cases where all values reported were distinct, there is no modal value; we then report this as blank ("-"). The proper interpretation of such a ("-") cell is that all values within the range are equally likely.

Source: Lallemand et al. 1998.

Table 27. Trip expenses (per year) for small trawlers in the Northeast, whose primary gear was otter trawl, 1996.

**Breakdown of Trip Expenses per Year**

| | Fuel Per year [a] ($/year) | Oil per year [a] ($/year) | Ice Per year [a] ($/year) | Food, Water per year [a] ($/year) | Lumpers Fees per year [a] ($/year) | Supplies Per year [a] ($/year) | Consignment Fees per year [a] ($/year) | Other Trip Expenses per year [a] ($/year) | Total Operating Costs per year in 1996 [a] ($/year) |
|---|---|---|---|---|---|---|---|---|---|
| Maximum | 36,000 | 4,980 | 8,410 | 11,832 | 8,960 | 17,500 | 14,790 | 18,560 | 65,000 |
| Minimum | 6,930 | 288 | 231 | 385 | 2,145 | 154 | 4,290 | 770 | 11,328 |
| Range | 29,070 | 4,692 | 8,179 | 11,447 | 6,815 | 17,346 | 10,500 | 17,790 | 53,672 |
| Mode | 13,930 | 1,990 | 1,990 | 2,490 | -[b] | 1,990 | -[b] | -[b] | 40,670 |
| Median | 15,600 | 1,550 | 2,940 | 3,000 | 3,980 | 3,638 | 9,730 | 2,818 | 33,824 |
| Mean | 17,368 | 1,862 | 3,392 | 4,300 | 4,635 | 6,281 | 9,628 | 5,200 | 34,317 |
| Standard Error of the Mean | 1,310.44 | 242.09 | 514.60 | 602.01 | 935.62 | 1,068.85 | 1,528.99 | 2,245.47 | 2,292.18 |
| Standard Dev. | 7,056.95 | 1,347.92 | 2,467.91 | 3,351.85 | 2,475.41 | 5,655.82 | 3,745.24 | 6,351.14 | 12,762.35 |
| Skewness | 1.07 | 0.96 | 0.65 | 0.83 | 0.93 | 0.89 | -0.08 | 1.75 | 0.19 |

| | Fuel | Oil | Ice | Food, Water | Lumpers Fees | Supplies | Consignment Fees | Other Trip Expenses | Total Operating Costs |
|---|---|---|---|---|---|---|---|---|---|
| Count | 29 | 31 | 23 | 31 | 7 | 28 | 6 | 8 | 31 |
| # of Trimmed Responses [a] | 6 | 4 | 5 | 2 | 3 | 3 | 4 | 1 | 4 |

[a] Cost Data were trimmed to exclude unusual values (i.e. values greater or lower than the Mean o 1 standard deviation respectively).

[b] In cases where all values reported were distinct, there is no modal value; we then report this as blank ("-"). The proper interpretation of such a ("-") cell is that all values within the range are equally likely.

Source: Lallemand et al. 1998

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Table 28. Number of trips by month for small trawlers in the Northeast, whose primary gear was otter trawl, 1996.

**Number of Trips by month**

| | January | February | March | April | May | June | July | August | September | October | November | December | Total number of Trips in 1996 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum** | 25.0 | 25.0 | 20.0 | 20.0 | 30.0 | 25.0 | 28.0 | 25.0 | 25.0 | 25.0 | 21.0 | 25.0 | 250.0 |
| **Minimum** | 1.0 | 1.5 | 2.0 | 2.0 | 2.0 | 1.0 | 1.0 | 2.0 | 2.0 | 1.0 | 1.0 | 1.0 | 22.0 |
| **Range** | 24.0 | 23.5 | 18.0 | 18.0 | 28.0 | 24.0 | 27.0 | 23.0 | 23.0 | 24.0 | 20.0 | 24.0 | 228.0 |
| **Mode** | 15.0 | 12.0 | 10.0 | 20.0 | 20.0 | 25.0 | 20.0 | 20.0 | 20.0 | 20.0 | 15.0 | 15.0 | 200.0 |
| **Median** | 11.0 | 11.0 | 12.0 | 13.5 | 19.0 | 16.0 | 20.0 | 20.0 | 19.0 | 15.0 | 13.0 | 12.0 | 166.0 |
| **Mean** | 11.3 | 11.4 | 11.9 | 12.7 | 15.1 | 15.7 | 15.9 | 16.4 | 15.2 | 13.9 | 12.3 | 11.6 | 150.0 |
| **Standard Error of the Mean** | 1.18 | 1.18 | 0.97 | 1.07 | 1.40 | 1.36 | 1.42 | 1.35 | 1.44 | 1.30 | 1.13 | 1.02 | 11.16 |
| **Standard Dev.** | 6.58 | 6.49 | 5.31 | 6.26 | 8.04 | 8.07 | 8.27 | 7.65 | 8.03 | 7.22 | 6.27 | 5.97 | 66.01 |
| **Skewness** | 0.33 | 0.42 | (0.26) | (0.40) | (0.37) | (0.38) | (0.52) | (0.63) | (0.44) | (0.47) | (0.40) | (0.16) | (0.45) |
| **Count** | 31 | 30 | 30 | 34 | 33 | 35 | 34 | 32 | 31 | 31 | 31 | 34 | 35 |

Source: Lallemand et al. 1998.

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Table 29. Days absent by month for small trawlers in the Northeast, whose primary gear was otter trawl, 1996.

**Days Absent by month**

| | January | February | March | April | May | June | July | August | September | October | November | December | Total Day Absent in 1996 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Maximum | 25.0 | 25.0 | 20.0 | 30.0 | 30.0 | 25.0 | 28.0 | 25.0 | 25.0 | 25.0 | 21.0 | 25.0 | 257.5 |
| Minimum | 1.0 | 2.0 | 4.0 | 3.0 | 2.0 | 3.0 | (1.0) | 2.0 | 3.0 | 3.0 | 2.0 | 1.0 | 22.0 |
| Range | 24.0 | 23.0 | 16.0 | 27.0 | 28.0 | 22.0 | 29.0 | 23.0 | 22.0 | 22.0 | 19.0 | 24.0 | 235.5 |
| Mode | 15.0 | 12.0 | 10.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 15.0 | 15.0 | 200.0 |
| Median | 12.0 | 12.0 | 13.5 | 15.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 18.0 | 15.0 | 14.5 | 193.0 |
| Mean | 12.2 | 12.3 | 13.0 | 14.7 | 17.6 | 17.9 | 17.6 | 18.7 | 17.5 | 16.2 | 14.3 | 12.7 | 170.3 |
| Standard Error of the Mean | 1.05 | 1.05 | 0.80 | 1.04 | 1.22 | 1.0? | 1.27 | 1.00 | 1.08 | 1.05 | 0.96 | 0.90 | 9.75 |
| Standard Dev. | 5.83 | 5.78 | 4.37 | 6.09 | 7.02 | 6.11 | 7.42 | 5.64 | 6.00 | 5.84 | 5.34 | 5.23 | 57.68 |
| Skewness | 0.39 | 0.52 | (0.11) | (0.10) | (0.63) | (0.58) | (1.10) | (0.98) | (0.74) | (0.86) | (0.76) | (0.33) | (0.81) |
| Count | 31 | 30 | 30 | 34 | 33 | 35 | 34 | 32 | 31 | 31 | 31 | 34 | 35 |

Source: Lallemand et al. 1998.

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Table 30. Steaming time by month for small trawlers in the Northeast, whose primary gear was otter trawl, 1996.

**Estimated Total Steaming Time by month (in hours)**

| | January | February | March | April | May | June | July | August | September | October | November | December | Total Steaming Time (hrs) in 1996 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Maximum | 104.0 | 104.0 | 100.0 | 140.0 | 200.0 | 252.0 | 168.0 | 150.0 | 168.0 | 120.0 | 252.0 | 208.0 | 1,452.0 |
| Minimum | 2.0 | 2.0 | 4.0 | 3.0 | 1.5 | 3.0 | (2.0) | 3.0 | 2.5 | 3.5 | 2.0 | 1.0 | 27.0 |
| Range | 102.0 | 102.0 | 96.0 | 137.0 | 198.5 | 249.0 | 170.0 | 147.0 | 165.5 | 116.5 | 250.0 | 207.0 | 1,425.0 |
| Mode | 24.0 | 40.0 | 30.0 | 20.0 | 30.0 | 25.0 | 20.0 | 24.0 | 40.0 | 30.0 | 30.0 | 30.0 | 204.0 |
| Median | 24.0 | 25.0 | 30.0 | 27.0 | 30.0 | 30.0 | 30.0 | 31.0 | 32.0 | 30.0 | 26.0 | 24.0 | 307.5 |
| Mean | 30.7 | 31.5 | 33.4 | 39.2 | 45.6 | 47.0 | 45.6 | 46.6 | 45.9 | 38.1 | 42.1 | 37.6 | 446.0 |
| Standard Error of the Mean | 4.07 | 4.33 | 4.20 | 5.64 | 8.34 | 8.79 | 7.65 | 7.32 | 7.37 | 5.72 | 9.89 | 7.51 | 64.99 |
| Standard Dev. | 22.65 | 23.71 | 23.01 | 32.91 | 47.91 | 52.02 | 44.62 | 41.42 | 41.05 | 31.85 | 55.06 | 43.77 | 384.48 |
| Skewness | 2.10 | 1.90 | 1.40 | 1.66 | 2.06 | 2.39 | 1.47 | 1.26 | 1.64 | 1.30 | 2.89 | 2.75 | 1.46 |
| Count | 31 | 30 | 30 | 34 | 33 | 35 | 34 | 32 | 31 | 31 | 31 | 34 | 35 |

Source: Lallemand et al. 1998.

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Table 31. Trip expenses (per trip) for large trawlers in the Northeast, whose primary gear was otter trawl, 1997.

| | Breakdown of Trip Expenses per Trip | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Fuel per Trip [a] ($/trip) | Oil per Trip [a] ($/trip) | Ice per Trip [a] ($/trip) | Food, Water per Trip [a] ($/trip) | Lumpers Fees per Trip [a] ($/trip) | Supplies per Trip [a] ($/trip) | Consignment Fees per Trip [a] ($/trip) | Other Trip Expenses [a] ($/trip) | Total Operating Costs per Trip in 1997 [a] ($/trip) |
| Maximum | 2,164 | 182 | 513 | 550 | 600 | 1,000 | 351 | 500 | 4,468 |
| Minimum | 507 | 25 | 184 | 205 | 13 | 141 | 115 | 15 | 1,090 |
| Range | 1,657 | 156 | 329 | 345 | 587 | 859 | 236 | 485 | 3,378 |
| Mode | -[b] | -[b] | 227 | -[b] | -[b] | -[b] | -[b] | -[b] | -[b] |
| Median | 1,440 | 78 | 300 | 360 | 265 | 526 | 189 | 100 | 2,490 |
| Mean | 1,369 | 84 | 333 | 372 | 257 | 528 | 224 | 137 | 2,608 |
| Standard Error of the Mean | 194.31 | 15.17 | 39.69 | 42.67 | 45.62 | 100.01 | 50.97 | 64.53 | 311.23 |
| Standard Dev. | 614.46 | 47.98 | 131.62 | 134.95 | 158.02 | 331.70 | 113.97 | 170.73 | 1,078.12 |
| Skewness | (0.27) | 0.86 | 0.34 | 0.03 | 0.57 | 0.17 | 0.36 | 2.04 | 0.24 |
| | | | | | | | | | |
| Count | 10 | 10 | 11 | 10 | 12 | 11 | 5 | 7 | 12 |
| # of Trimmed Responses [a] | 5 | 3 | 5 | 6 | 1 | 4 | 2 | 2 | 4 |

[a] Cost Data were trimmed to exclude unusual values (i.e. values greater or lower than the Mean o 1 standard deviation respectively).

[b] In cases where all values reported were distinct, there is no modal value; we then report this as blank ("-"). The proper interpretation of such a ("-") cell is that all values within the range are equally likely.

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Source: Lallemand et al. 1999.

Table 32. Trip expenses (per day) for large trawlers in the Northeast, whose primary gear was otter trawl, 1997.

**Breakdown of Trip Expenses per Day**

| | Fuel per day [a] ($/day) | Oil per day [a] ($/day) | Ice per day [a] ($/day) | Food, Water per day [a] ($/day) | Lumpers Fees per day [a] ($/day) | Supplies Per day [a] ($/day) | Consignment Fees per day [a] ($/day) | Other Trip Expenses per day [a] ($/day) | Total Operating Costs per day in 1997 [a] ($/day) |
|---|---|---|---|---|---|---|---|---|---|
| **Maximum** | 384 | 25 | 94 | 92 | 69 | 175 | 67 | 65 | 760 |
| **Minimum** | 260 | 13 | 40 | 42 | 12 | 35 | 6 | 4 | 144 |
| **Range** | 124 | 12 | 54 | 50 | 57 | 140 | 60 | 62 | 617 |
| **Mode** | -[b] | -[b] | -[b] | -[b] | -[b] | -[b] | -[b] | -[b] | -[b] |
| **Median** | 341 | 20 | 58 | 56 | 40 | 85 | 31 | 25 | 481 |
| **Mean** | 332 | 21 | 62 | 60 | 42 | 95 | 32 | 24 | 472 |
| **Standard Error of the Mean** | 11.42 | 1.59 | 5.65 | 5.03 | 5.19 | 14.09 | 8.58 | 8.25 | 51.94 |
| **Standard Dev.** | 37.86 | 4.22 | 17.87 | 16.68 | 17.99 | 48.80 | 21.02 | 21.83 | 201.17 |
| **Skewness** | (0.64) | (0.74) | 0.90 | 1.32 | 0.01 | 0.42 | 0.68 | 1.19 | (0.39) |

| | Fuel | Oil | Ice | Food, Water | Lumpers Fees | Supplies | Consignment Fees | Other Trip Expenses | Total Operating Costs |
|---|---|---|---|---|---|---|---|---|---|
| **Count** | 11 | 7 | 10 | 11 | 12 | 12 | 6 | 7 | 15 |
| **# of Trimmed Responses [a]** | 4 | 6 | 6 | 5 | 1 | 3 | 1 | 2 | 1 |

[a] Cost Data were trimmed to exclude unusual values (i.e. values greater or lower than the Mean o 1 standard deviation respectively).

[b] In cases where all values reported were distinct, there is no modal value; we then report this as blank ("-"). The proper interpretation of such a ("-") cell is that all values within the range are equally likely.

Source: Lallemand et al. 1999.

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Table 33. Trip expenses (per year) for large trawlers in the Northeast, whose primary gear was otter trawl, 1997.

| | Fuel Per year [a] ($/ year) | Oil per year [a] ($/ year) | Ice Per year [a] ($/ year) | Food, Water per year [a] ($/ year) | Lumpers Fees per year [a] ($/ year) | Supplies Per year [a] ($/ year) | Consignment Fees per year [a] ($/ year) | Other Trip Expenses per year [a] ($/ year) | Total Operating Costs per year in 1997 [a] ($/ year) |
|---|---|---|---|---|---|---|---|---|---|
| **Breakdown of Trip Expenses per Year** | | | | | | | | | |
| **Maximum** | 81,600 | 5,500 | 19,000 | 19,000 | 17,200 | 34,000 | 12,286 | 12,000 | 202,640 |
| **Minimum** | 53,215 | 2,600 | 6,000 | 7,000 | 1,500 | 3,800 | 1,500 | 800 | 61,248 |
| **Range** | 28,385 | 2,900 | 13,000 | 12,000 | 15,700 | 30,200 | 10,786 | 11,200 | 141,392 |
| **Mode** | - [b] | 3,000 | 9,000 | 12,000 | - [b] | 20,000 | - [b] | - [b] | - [b] |
| **Median** | 76,000 | 4,000 | 10,000 | 12,000 | 7,250 | 15,030 | 4,457 | 3,500 | 127,550 |
| **Mean** | 71,728 | 4,082 | 11,251 | 12,983 | 7,806 | 16,372 | 5,783 | 4,286 | 132,136 |
| **Standard Error of the Mean** | 3,829.29 | 375.70 | 1,146.56 | 1,168.66 | 1,151.51 | 2,376.98 | 1,664.42 | 1,484.86 | 13,630.49 |
| **Standard Dev.** | 10,830.87 | 1,127.10 | 4,133.97 | 3,876.00 | 3,988.96 | 8,570.33 | 4,076.97 | 3,928.57 | 47,217.41 |
| **Skewness** | -0.85 | 0.09 | 0.60 | 0.31 | 1.03 | 0.77 | 0.89 | 1.42 | 0.08 |
| **Count** | 8 | 9 | 13 | 11 | 12 | 13 | 6 | 7 | 12 |
| **# of Trimmed Responses [a]** | 7 | 4 | 3 | 5 | 1 | 2 | 1 | 2 | 4 |

[a] Cost Data were trimmed to exclude unusual values (i.e. values greater or lower than the Mean o 1 standard deviation respectively).

[b] In cases where all values reported were distinct, there is no modal value; we then report this as blank ("-"). The proper interpretation of such a ("-") cell is that all values within the range are equally likely.

Source: Lallemand et al. 1999.

Table 34. Number of trips by month for large trawlers in the Northeast, whose primary gear was otter trawl, 1997.

**Number of Trips by month**

| | January | February | March | April | May | June | July | August | September | October | November | December | Total number of Trips in 1997 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum** | 20.0 | 20.0 | 16.0 | 16.0 | 25.0 | 28.0 | 28.0 | 30.0 | 22.5 | 20.0 | 20.0 | 20.0 | 217.5 |
| **Minimum** | 2.0 | 2.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 19.0 |
| **Range** | 18.0 | 18.0 | 15.0 | 15.0 | 24.0 | 27.0 | 27.0 | 29.0 | 21.5 | 19.0 | 19.0 | 19.0 | 198.5 |
| **Mode** | 2.0 | 2.0 | 6.0 | 4.0 | 2.0 | 1.0 | 2.0 | 2.0 | 2.0 | 5.0 | 2.0 | 3.0 | 19.0 |
| **Median** | 4.0 | 4.0 | 5.0 | 4.0 | 4.5 | 4.0 | 4.0 | 4.0 | 3.3 | 4.0 | 3.8 | 3.0 | 47.5 |
| **Mean** | 5.3 | 5.3 | 5.0 | 4.7 | 7.9 | 8.0 | 8.6 | 7.7 | 6.5 | 5.8 | 5.1 | 5.7 | 71.8 |
| **Standard Error of the Mean** | 0.93 | 0.91 | 0.67 | 0.74 | 1.51 | 1.91 | 1.86 | 1.81 | 1.37 | 1.15 | 0.99 | 1.15 | 11.68 |
| **Standard Dev.** | 4.58 | 4.48 | 3.29 | 3.61 | 7.40 | 9.36 | 9.11 | 8.85 | 6.70 | 5.63 | 4.86 | 5.65 | 57.21 |
| **Skewness** | 2.33 | 2.33 | 1.84 | 1.89 | 1.02 | 1.32 | 1.11 | 1.62 | 1.51 | 1.87 | 2.03 | 1.68 | 1.12 |
| **Count** | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 |

Source: Lallemand et al. 1999.

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**Table 35. Days absent by month for large trawlers in the Northeast, whose primary gear was otter trawl, 1997.**

**Days Absent by month**

| | January | February | March | April | May | June | July | August | September | October | November | December | Total Day Absent in 1997 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Maximum | 28.0 | 28.0 | 28.0 | 26.0 | 28.0 | 28.0 | 28.0 | 30.0 | 28.0 | 30.0 | 28.0 | 28.0 | 278.0 |
| Minimum | 3.8 | 0.4 | 5.1 | 2.0 | 4.0 | 1.1 | 7.0 | 7.0 | 3.8 | 8.8 | 2.0 | 2.0 | 107.0 |
| Range | 24.2 | 27.6 | 22.9 | 24.0 | 24.0 | 26.9 | 21.0 | 23.0 | 24.2 | 21.2 | 26.0 | 26.0 | 171.0 |
| Mode | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 240.0 |
| Median | 15.5 | 18.6 | 17.0 | 16.0 | 18.0 | 20.0 | 19.9 | 17.8 | 17.2 | 18.0 | 14.8 | 14.9 | 184.3 |
| Mean | 15.8 | 17.6 | 16.7 | 15.5 | 17.0 | 16.9 | 18.6 | 17.4 | 16.1 | 17.3 | 14.6 | 14.7 | 188.4 |
| Standard Error of the Mean | 1.31 | 1.13 | 1.16 | 1.24 | 1.28 | 1.54 | 1.06 | 1.26 | 1.34 | 1.20 | 1.36 | 1.22 | 10.41 |
| Standard Dev. | 6.44 | 5.54 | 5.69 | 6.10 | 6.26 | 7.55 | 5.20 | 6.16 | 6.56 | 5.86 | 6.66 | 5.98 | 50.98 |
| Skewness | (0.14) | (1.19) | (0.31) | (0.41) | (0.31) | (0.41) | (0.17) | 0.06 | (0.31) | 0.41 | (0.16) | (0.11) | 0.14 |
| | | | | | | | | | | | | | |
| Count | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 |

Source: Lallemand et al. 1999.

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Table 36. Steaming time by month for large trawlers in the Northeast, whose primary gear was otter trawl, 1997.

## Estimated Total Steaming Time by month (in hours)

| | January | February | March | April | May | June | July | August | September | October | November | December | Total Steaming Time (hrs) in 1997 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Maximum | 210.0 | 364.5 | 268.6 | 302.5 | 320.0 | 374.9 | 520.0 | 255.5 | 418.3 | 185.5 | 177.8 | 264.0 | 2,292.1 |
| Minimum | 36.0 | 4.9 | 8.0 | 8.0 | 20.0 | 17.2 | 16.0 | 26.0 | 7.5 | 12.1 | 8.0 | 8.0 | 412.0 |
| Range | 174.0 | 359.6 | 260.6 | 294.5 | 300.0 | 357.8 | 504.0 | 229.5 | 410.8 | 173.4 | 169.8 | 256.0 | 1,880.1 |
| Mode | 120.0 | [a] | 60.0 | 60.0 | 80.0 | [a] | [a] | 60.0 | 60.0 | 80.0 | 90.0 | 100.0 | [a] |
| Median | 99.9 | 103.5 | 102.0 | 85.0 | 85.6 | 70.0 | 77.6 | 60.0 | 70.0 | 80.0 | 80.0 | 87.5 | 1,183.2 |
| Mean | 108.5 | 126.7 | 107.9 | 106.7 | 105.7 | 96.2 | 148.0 | 94.2 | 100.5 | 78.6 | 81.1 | 84.3 | 1,170.0 |
| Standard Error of the Mean | 11.07 | 18.41 | 12.86 | 15.96 | 14.02 | 18.80 | 30.85 | 14.31 | 20.18 | 8.60 | 8.98 | 11.47 | 111.79 |
| Standard Dev. | 51.93 | 88.27 | 62.99 | 76.54 | 68.69 | 86.14 | 141.39 | 68.63 | 94.67 | 41.27 | 43.99 | 55.01 | 547.64 |
| Skewness | 0.41 | 1.33 | 0.84 | 1.02 | 1.62 | 2.01 | 1.39 | 1.27 | 2.28 | 0.78 | 0.56 | 1.64 | 0.37 |
| | | | | | | | | | | | | | |
| Count | 22 | 23 | 24 | 23 | 24 | 21 | 21 | 23 | 22 | 23 | 24 | 23 | 24 |

[a] In cases where all values reported were distinct, there is no modal value; we then report this as blank ("-"). The proper interpretation of such a ("-") cell is that all values within the range are equally likely.

Source: Lallemand et al. 1999.

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**Table 37.  Estimated average annual operating costs for pot and trap vessels in 2000.**

| Expenditure Category | Average Annual  Expense ($'s) |
|---|---|
| Boat Repair and Maintenance - By Yard | 576.14 |
| Boat Repair and Maintenance - By Owner | 3,445.63 |
| Supplies (Store) | 3,105.36 |
| Food | 1,240.83 |
| Gear Maintenance (Normal Use) | 4,162.50 |
| Fuel and Lubricants | 6,506.27 |
| Vehicles | 3,435.71 |

Source: University of Rhode Island lobster simulator data less bait expenditures.

**Table 38.  Total ex-vessel value of all finfish and shellfish landings, ex-vessel value of scup, and scup as a percentage of the total ex-vessel value by state, 1999 and 2000.**

| | | 1999 | | | 2000 | |
|---|---|---|---|---|---|---|
| State | Total Ex-vessel Value ($1,000) | Scup Ex-vessel Value ($1,000) | Scup Percent | Total Ex-vessel Value ($1,000) | Scup Ex-vessel Value ($1,000) | Scup Percent |
| ME | 323,809 | 0 | 0.00 | 354,055 | 0 | 0.00 |
| NH | 12,542 | 0 | 0.00 | 13,951 | 0 | 0.00 |
| MA | 260,239 | 774 | 0.30 | 288,262 | 448 | 0.16 |
| RI | 79,270 | 1,672 | 2.11 | 72,544 | 1,252 | 1.73 |
| CT | 38,090 | 177 | 0.47 | 31,227 | 175 | 0.56 |
| NY | 76,046 | 718 | 0.94 | 59,425 | 906 | 1.52 |
| NJ | 97,555 | 885 | 0.91 | 107,163 | 552 | 0.52 |
| DE | 6,893 | 0 | 0.00 | 6,707 | <1 | 0.00 |
| MD | 63,759 | <1 | 0.00 | 53,874 | <1 | 0.00 |
| VA | 108,253 | 1 | 0.00 | 118,336 | 1 | 0.00 |
| NC | 30,689 | <1 | 0.00 | 36,739 | <1 | 0.00 |
| Total | 1,097,146 | 4,228 | 0.39 | 1,142,283 | 3,333 | 0.29 |

**Table 39. Average willingness to pay for a one-day fishing trip, by state in 1994.**

| State | Mean ($'s) | Adjusted to 2000 ($'s)[a] |
|---|---|---|
| Maine | 6.40 | 7.44 |
| New Hampshire | 0.85 | 0.99 |
| Massachusetts | 8.38 | 9.74 |
| Rhode Island | 4.23 | 4.92 |
| Connecticut | 3.07 | 3.57 |
| New York | 21.58 | 25.07 |
| New Jersey | 14.12 | 16.41 |
| Delaware | 1.43 | 1.66 |
| Maryland | 12.09 | 14.05 |
| Virginia | 42.33 | 49.19 |

[a] - Prices were adjusted using the Bureau of Labor Statistics Consumer Price Index.

**Table 40. Aggregate willingness to pay for anglers that indicated they were targeting black sea bass in 2000.**

| State | Willingness to pay ($'s) |
|---|---|
| Maine | 0 |
| New Hampshire | 0 |
| Massachusetts | 47,444 |
| Rhode Island | 55,389 |
| Connecticut | 0 |
| New York | 1,349,393 |
| New Jersey | 1,746,762 |
| Delaware | 19,286 |
| Maryland | 197,585 |
| Virginia | 1,574,769 |

**Table 41. Willingness to pay for a one fish increase in the catch rate of bottom fish per trip, Maine to Virginia, 1994.**

| State | Mean ($'s) | Adjusted to 2000 ($'s)[a] |
|---|---|---|
| Maine | 2.62 | 3.04 |
| New Hampshire | 2.14 | 2.49 |
| Massachusetts | 2.04 | 2.37 |
| Rhode Island | 2.11 | 2.45 |
| Connecticut | 2.25 | 2.61 |
| New York | 1.63 | 1.89 |
| New Jersey | 1.73 | 2.01 |
| Delaware | 2.06 | 2.39 |
| Maryland | 2.44 | 2.84 |
| Virginia | 1.79 | 2.08 |
| All States | 1.97 | 2.29 |

[a] - Prices were adjusted using the Bureau of Labor Statistics Consumer Price Index.

**Table 42. State-by-state allocations of the coastwide black sea bass commercial quota implemented by Amendment 1.**

| State | Percent of Coastwide Quota |
|---|---|
| Maine | .5 |
| New Hampshire | .5 |
| Massachusetts | 13 |
| Rhode Island | 11 |
| Connecticut | 1 |
| New York | 7 |
| New Jersey | 20 |
| Delaware | 5 |
| Maryland | 11 |
| Virginia | 20 |
| North Carolina | 11 |

**Table 43. State-by-state black sea bass landings for various time periods.**

| State | 1980-1997 | % | 1988-1997 | % | 1993-1997 | % | Best 5-years[1] 1980-1997 | % | Best 5-years[2] 1988-1997 | % | 1997-2001 | % | 2001 | % | State Allocation % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ME | 13,561 | 0.02 | 7,561 | 0.03 | 103 | 0.00 | 13,543 | 0.05 | 7,553 | 0.04 | 474 | 0.00 | 465 | 0.02 | 0.50 |
| NH | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.50 |
| MA | 3,906,939 | 6.86 | 1,783,939 | 6.02 | 232,435 | 1.76 | 2,100,212 | 8.44 | 1,599,386 | 8.49 | 2,141,448 | 15.95 | 570,300 | 20.61 | 13.00 |
| RI | 5,085,716 | 8.93 | 1,571,716 | 5.31 | 732,467 | 5.53 | 2,872,000 | 11.54 | 1,024,144 | 5.44 | 965,872 | 7.19 | 375,944 | 13.58 | 11.00 |
| CT | 266,297 | 0.47 | 144,297 | 0.49 | 45,962 | 0.35 | 179,061 | 0.72 | 112,933 | 0.60 | 65,574 | 0.49 | 15,349 | 0.55 | 1.00 |
| NY | 2,651,773 | 4.65 | 1,443,773 | 4.88 | 970,078 | 7.33 | 1,187,462 | 4.77 | 970,078 | 5.15 | 1,001,986 | 7.46 | 251,233 | 9.08 | 7.00 |
| NJ | 16,154,960 | 28.36 | 10,351,960 | 34.96 | 5,061,750 | 38.25 | 6,136,717 | 24.66 | 6,061,850 | 32.17 | 3,018,782 | 22.49 | 646,824 | 23.37 | 20.00 |
| DE | 2,280,763 | 4.00 | 1,475,763 | 4.98 | 640,077 | 4.84 | 927,900 | 3.73 | 885,948 | 4.70 | 473,815 | 3.53 | 25,449 | 0.92 | 5.00 |
| MD | 6,055,698 | 10.63 | 3,926,698 | 13.26 | 1,944,254 | 14.69 | 2,500,922 | 10.05 | 2,403,622 | 12.76 | 1,719,410 | 12.81 | 147,254 | 5.32 | 11.00 |
| VA | 14,031,720 | 24.63 | 6,218,720 | 21.00 | 2,811,785 | 21.25 | 5,653,000 | 22.72 | 3,880,538 | 20.60 | 3,328,308 | 24.79 | 607,025 | 21.93 | 20.00 |
| NC | 6,521,467 | 11.45 | 2,690,467 | 9.08 | 796,013 | 6.01 | 3,315,729 | 13.32 | 1,895,175 | 10.06 | 708,770 | 5.28 | 127,856 | 4.62 | 11.00 |
| Total | 56,968,894 | 100.00 | 29,614,894 | 100.00 | 13,234,924 | 100.00 | 24,886,546 | 100.00 | 18,841,227 | 100.00 | 13,424,439 | 100.00 | 2,767,699 | 100.00 | 100.00 |

[1] Best 5-years commercial landings for each state during the 1980 to 1997 period.
[2] Best 5-years commercial landings for each state during the 1988 to 1997 period.

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**Table 44. Catch disposition for trips that kept 100 or more pounds of black sea bass, 1999, all gear combined.**

| Species | Landed (lbs) | % of Total Landed | Discarded (lbs) | % of Total Discarded | Total Catch (lbs) |
|---|---|---|---|---|---|
| BLUEFISH | 130471 | 99.889 | 145 | 0.111 | 130616 |
| BONITO | 1378 | 100 | 0 | 0 | 1378 |
| BUTTERFISH | 380750 | 97.853 | 8355 | 2.1472 | 389105 |
| COBIA | 62 | 100 | 0 | 0 | 62 |
| COD | 17366 | 99.919 | 14 | 0.0806 | 17380 |
| CREVALLE | 23 | 100 | 0 | 0 | 23 |
| CROAKER, ATLANTIC | 910288 | 99.78 | 2009 | 0.2202 | 912297 |
| CUNNER | 705 | 59.949 | 471 | 40.051 | 1176 |
| CUSK | 4 | 100 | 0 | 0 | 4 |
| DOLPHIN FISH | 456 | 98.701 | 6 | 1.2987 | 462 |
| DRUM, BLACK | 8 | 100 | 0 | 0 | 8 |
| HERRING, BLUE BACK | 2425 | 66.749 | 1208 | 33.2508 | 3633 |
| EEL, CONGER | 11462 | 100 | 0 | 0 | 11462 |
| EEL, NK | 24579 | 99.862 | 34 | 0.1381 | 24613 |
| FLOUNDER, WINTER | 71929 | 99.886 | 82 | 0.1139 | 72011 |
| FLOUNDER, SUMMER | 1160804 | 97.101 | 34658 | 2.8991 | 1195462 |
| FLOUNDER, WITCH | 21242 | 99.953 | 10 | 0.0471 | 21252 |
| FLOUNDER, YELLOWTAIL | 9418 | 99.524 | 45 | 0.4755 | 9463 |
| FLOUNDER, AM. PLAICE | 681 | 100 | 0 | 0 | 681 |
| FLOUNDER, SAND-DAB | 1572 | 100 | 0 | 0 | 1572 |
| FLOUNDERS (NK) | 827 | 100 | 0 | 0 | 827 |
| FLOUNDER, FOURSPOT | 2337 | 100 | 0 | 0 | 2337 |
| GROUPER | 1529 | 100 | 0 | 0 | 1529 |
| GRUNTS | 300 | 97.72 | 7 | 2.2801 | 307 |
| HADDOCK | 6773 | 100 | 0 | 0 | 6773 |
| HAKE, RED | 419949 | 98.638 | 5798 | 1.3618 | 425747 |
| HAKE, WHITE | 76451 | 98.353 | 1280 | 1.6467 | 77731 |
| HAKE MIX RED & WHITE | 11860 | 100 | 0 | 0 | 11860 |
| HALIBUT, ATLANTIC | 25 | 100 | 0 | 0 | 25 |
| HERRING, ATLANTIC | 13075 | 100 | 0 | 0 | 13075 |
| JOHN DORY | 15307 | 100 | 0 | 0 | 15307 |
| MACKEREL, KING | 7 | 100 | 0 | 0 | 7 |
| WHITING, KING | 37163 | 100 | 0 | 0 | 37163 |
| MACKEREL, ATLANTIC | 996886 | 99.361 | 6410 | 0.6389 | 1003296 |
| MULLETS | 200 | 100 | 0 | 0 | 200 |
| REDFISH | 20 | 100 | 0 | 0 | 20 |
| ROSEFISH,BLK BELLIED | 121 | 100 | 0 | 0 | 121 |
| POUT, OCEAN | 4135 | 96.118 | 167 | 3.8819 | 4302 |
| PIGFISH | 509 | 100 | 0 | 0 | 509 |
| POLLOCK | 1207 | 99.097 | 11 | 0.9031 | 1218 |
| POMPANO, COMMON | 3 | 100 | 0 | 0 | 3 |
| SCULPINS | 20 | 100 | 0 | 0 | 20 |
| SEA RAVEN | 390 | 90.698 | 40 | 9.3023 | 430 |
| SCUP | 996804 | 97.911 | 21267 | 2.089 | 1018071 |
| SEA BASS, BLACK | 2267913 | 92.322 | 188616 | 7.6782 | 2456529 |
| SNAPPER | 69 | 100 | 0 | 0 | 69 |
| SEA ROBINS | 3581 | 87.834 | 496 | 12.1658 | 4077 |
| WEAKFISH, SQUETEAGUE | 25237 | 97.301 | 700 | 2.6988 | 25937 |
| WEAKFISH, SPOTTED | 7053 | 91.681 | 640 | 8.3193 | 7693 |
| DOGFISH CHAIN | 10923 | 99.854 | 16 | 0.1463 | 10939 |

**Table 44 (continued). Catch disposition for trips that kept 100 or more pounds of black sea bass, 1999, all gear combined.**

| Species | Landed (lbs) | % of Total Landed | Discarded (lbs) | % of Total Discarded | Total Catch (lbs) |
|---|---|---|---|---|---|
| SHAD, AMERICAN | 1238 | 99.839 | 2 | 0.1613 | 1240 |
| DOGFISH (NK) | 71549 | 99.958 | 30 | 0.0419 | 71579 |
| DOGFISH SMOOTH | 1538 | 99.805 | 3 | 0.1947 | 1541 |
| DOGFISH SPINY | 211969 | 99.653 | 739 | 0.3474 | 212708 |
| SHEEPSHEAD | 539 | 100 | 0 | 0 | 539 |
| SKATES | 241838 | 99.668 | 806 | 0.3322 | 242644 |
| SPADEFISH | 215 | 100 | 0 | 0 | 215 |
| MACKEREL, SPAN | 502 | 100 | 0 | 0 | 502 |
| TUNA, YELLOWFIN | 1589 | 100 | 0 | 0 | 1589 |
| SHARK, BLACK TIP | 38 | 100 | 0 | 0 | 38 |
| SHARK, ATL SHARPNOSE | 2 | 100 | 0 | 0 | 2 |
| WHITING, BLACK | 222736 | 99.821 | 400 | 0.1793 | 223136 |
| HAKE, SILVER | 1822887 | 99.475 | 9612 | 0.5245 | 1832499 |
| WOLFFISHES | 1034 | 100 | 0 | 0 | 1034 |
| OTHER FISH | 3367 | 100 | 0 | 0 | 3367 |
| CRAB, JONAH | 27897 | 95.744 | 1240 | 4.2558 | 29137 |
| CRAB, ROCK | 581 | 99.828 | 1 | 0.1718 | 582 |
| CRAB, NK | 159 | 3.805 | 4020 | 96.1953 | 4179 |
| CRAB, HORSESHOE | 5699 | 100 | 0 | 0 | 5699 |
| LOBSTER | 79067 | 90.641 | 8164 | 9.3591 | 87231 |
| CONCHS | 827 | 100 | 0 | 0 | 827 |
| WHELK, CHANNELED | 59637 | 99.931 | 41 | 0.0687 | 59678 |
| WHELK, KNOBBED | 324 | 100 | 0 | 0 | 324 |
| OCTOPUS | 5 | 100 | 0 | 0 | 5 |
| SCALLOP, CALICO | 140 | 100 | 0 | 0 | 140 |
| SCALLOP, SEA | 55120 | 99.101 | 500 | 0.899 | 55620 |
| SQUID (LOLIGO) | 1855099 | 99.829 | 3174 | 0.1708 | 1858273 |
| SQUID (ILLEX) | 18978 | 100 | 0 | 0 | 18978 |
| SQUIDS (NS) | 333004 | 99.988 | 40 | 0.012 | 333044 |
| OTHER SHELLFISH | 30 | 100 | 0 | 0 | 30 |

**Table 45. Mean recreational anglers' ratings of reasons for marine fishing, by subregion.**

| | New England | | | Mid-Atlantic | | |
|---|---|---|---|---|---|---|
| Statement | Not Important | Somewhat Important | Very Important | Not Important | Somewhat Important | Very Important |
| To Spend Quality Time with Friends and Family | 4.4% | 14.3% | 81.3% | 3.0% | 12.0% | 85.0% |
| To Enjoy Nature and the Outdoors | 1.4% | 10.1% | 88.5% | 1.1% | 11.6% | 87.3% |
| To Catch Fish to Eat | 42.2% | 37.4% | 20.4% | 29.3% | 40.1% | 30.6% |
| To Experience the Excitement or Challenge of Sport Fishing | 6.2% | 24.9% | 68.8% | 8.4% | 26.0% | 65.6% |
| To be Alone | 55.0% | 27.9% | 17.1% | 57.7% | 25.8% | 16.4% |
| To Relax and Escape from my Daily Routine | 3.4% | 13.3% | 83.3% | 2.6% | 11.9% | 85.5% |
| To Fish in a Tournament of when Citations are Available | 78.6% | 14.0% | 7.4% | 73.4% | 17.1% | 9.5% |

Source: Steinback and O'Neil. MS.

**Table 46. Black sea bass landings (percentage) by gear type, Maine to Cape Hatteras, North Carolina, for various time periods.**

| Gear Type | 88-97 | 93-97 | 00 |
|---|---|---|---|
| Bottom/Mid water trawls | 45.82% | 45.51% | 29.88% |
| Pot/Traps | 44.72% | 43.14% | 48.82% |
| Gill Nets | 0.40% | 0.65% | 1.56% |
| Lines | 7.75% | 8.37% | 13.67% |
| Other | 1.31% | 2.33% | 6.07% |